CIO

THE MAGAZINE FOR INFORMATION EXECUTIVES

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COVER STORY

The U.S. Coast Guard Wants You

Could This Be Your Future Employer?

The United States Coast Guard's
Vice Admiral Kent H. Williams

AN INTERNATIONAL DATA GROUP PUBLICATION

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alled the ***Customerize*** process. **cus·tom·er·ize**\kŭs'-tə-mə-rīz'\ Manage information to better serve and attract customers - the Unisys Customerize philosophy. Who benefits? *You do.*

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CIO Search and Rescue

The Coast Guard didn't use a CIO to rescue it from troubled IS waters. Now that it's in calmer seas, however, it's looking for a captain to chart a smoother course for the future.

By Richard Pastore

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Cover photo by
Katherine Lambert

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The Highway Patrol

In cities beset by traffic snarls, building new roads just makes matters worse. But technology can pave the way for a smoother commute.

By Peter Fabris

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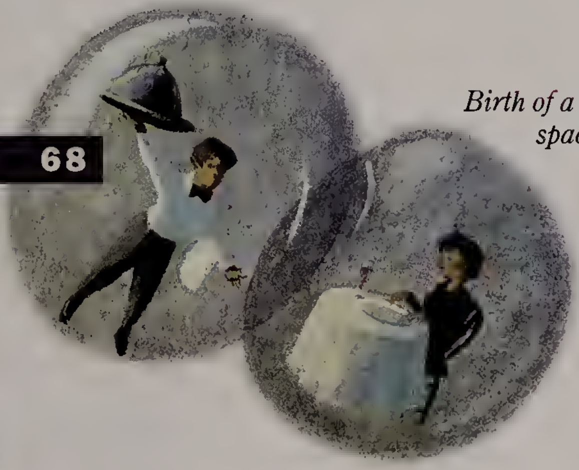
Mutable Markets

What would you call a marketplace that was created, defined, nurtured and exploited through the use of information technology? Some business theorists are calling it a market*space.*

By Christopher Koch



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The Year in Review

An index of all major articles published in *CIO* in 1995, including a cross-reference by article type.

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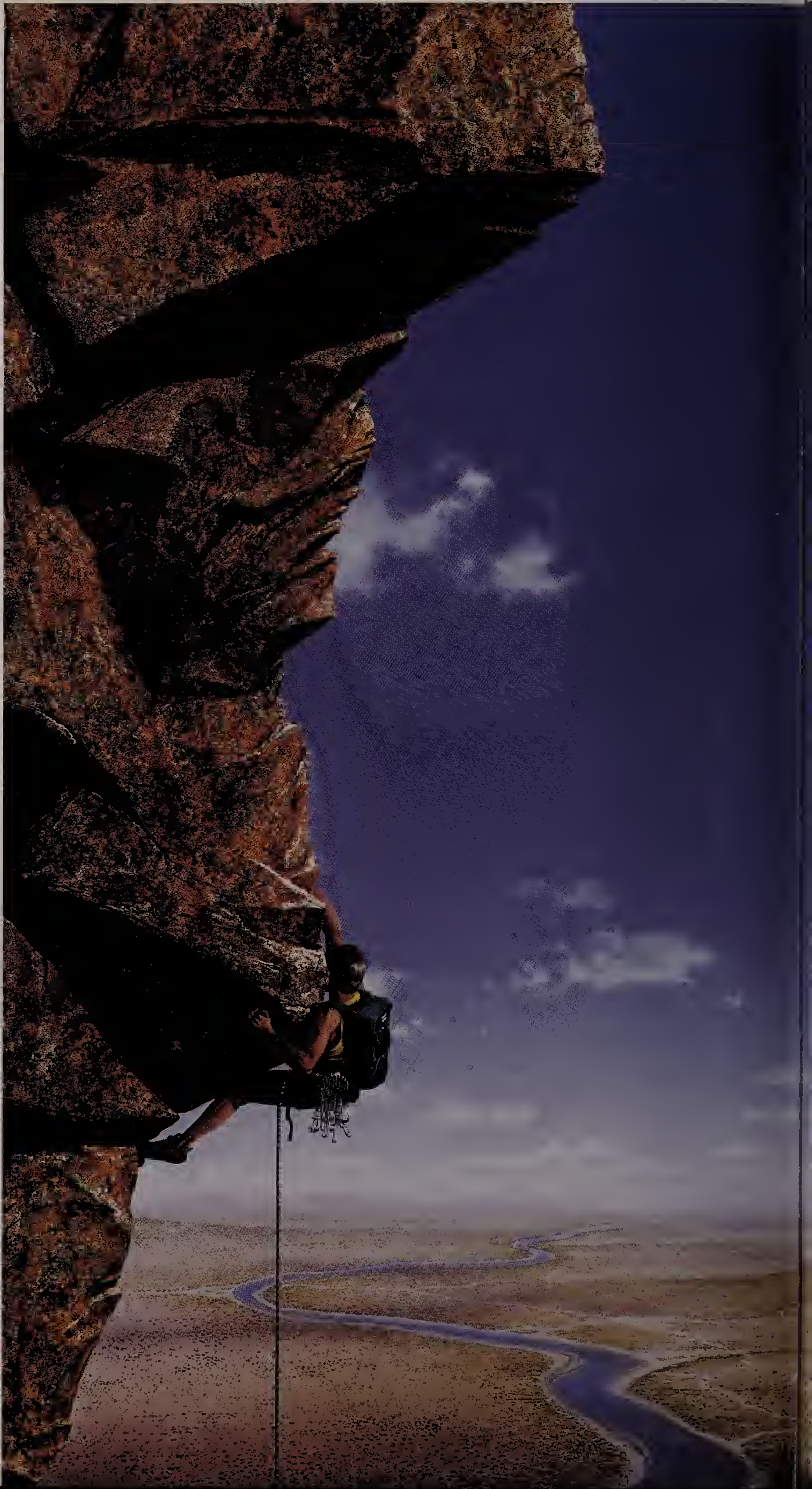

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CIO

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FIRST PERSON: WIZARD OF ODDS

A crisis in customer confidence convinced Equitable to scrap an existing system and start from scratch. Was it a gutsy move or a strategy for survival? Or both?

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At a recent conference, CIOs discover that real learning means never having to say you're sorry.

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"FOCUS/EIS GAVE US MORE THAN GREAT DECISION SUPPORT. IT GAVE US ESP."

Mr. Iwama, president of Konica Imaging, U.S.A., and a FOCUS/EIS user

Carmine Morello
IS Director
Konica Imaging, U.S.A.

ESP It's an abbreviation for "Encouraging, Striving, Providing"... the company motto for Konica Imaging, U.S.A. It's also the name of Konica's new suite of killer apps for decision-support developed in just 10 weeks using FOCUS/EIS for Windows.

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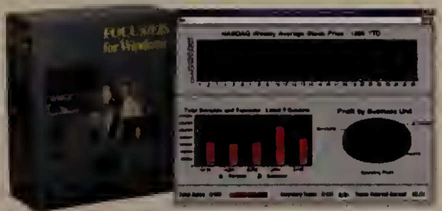

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LETTER FROM THE EDITOR

The federal government has spent $200 billion on information technology over the past 12 years. Yet in a recent report, the U.S. General Accounting Office (GAO) concluded with exquisite understatement that the federal government has "an information management problem."

It's encouraging, then, to observe genuine attempts by federal policy makers, state program planners and city authorities to wring more efficiency from their IT investments.

The U.S. Coast Guard is one example of a federal agency that decided to get its IT house in order, as Managing Editor Richard Pastore explains in "CIO Search and Rescue" (see Page 54). Chastised by the GAO in 1990 for its lack of an information resources management plan and top-level IS leadership to implement it, the Coast Guard attacked its IS deficiencies with a refreshing new approach. Defying conventional business thinking, the agency set out to solve its IT problems *before* hiring a CIO rather than after filling the position.

Today the Coast Guard is moving to a client/server environment, creating an IT investment review board and designing its first cross-functional database. With that groundwork in place, the Coast Guard expects to hire its first CIO within a year.

At the local government level, Staff Writer Peter Fabris has been tracking IT developments in traffic management. In "The Highway Patrol," beginning on Page 38, Fabris describes how officials in major metropolitan areas around the country are devising and deploying smart technology to relieve traffic congestion.

For example, traffic in Montgomery County, Md., is projected to double in the next 15 years. But next year, county transportation officials will begin to use the U.S. military's Global Positioning Satellite system to help keep the county's 250 mass-transit buses on schedule. Better on-time performance and realistic schedule information will encourage more commuters to leave their cars at home and ride the bus, thereby reducing gridlock. Fabris also reports on how Los Angeles and Atlanta are harnessing technology as a transportation logistics tool.

Innovative, government-led systems like these are the forerunners of IT-based traffic management infrastructures that will appear in more cities around the country. Work may be no easier, but getting there should be.

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PHOTO BY WEBB CHAPPELL

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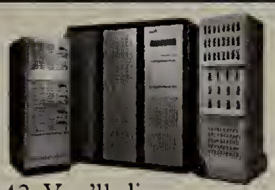

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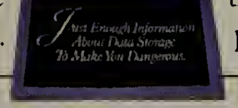

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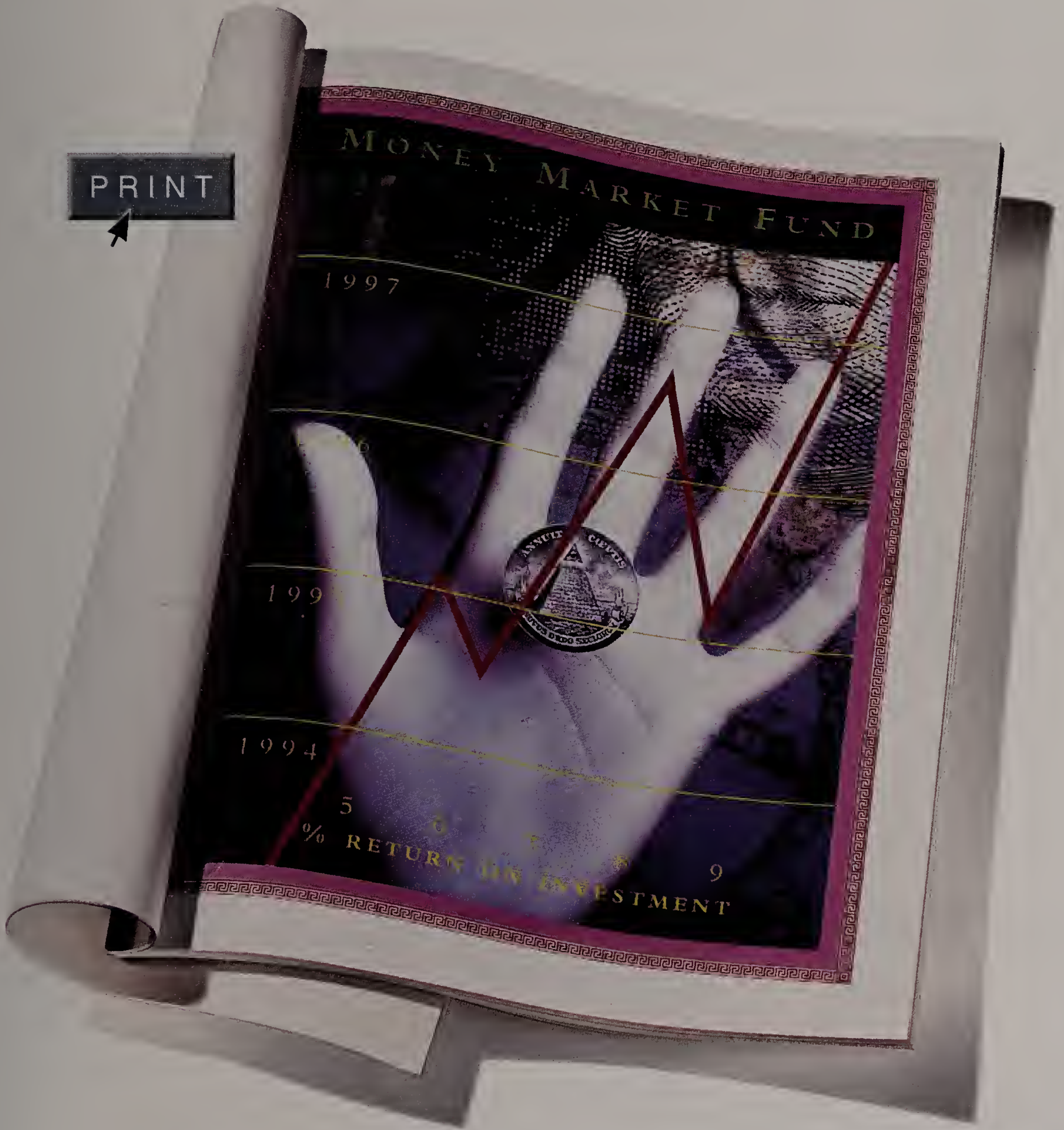

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LETTER FROM THE PUBLISHER

"Right now, if you're a CIO, you have a responsibility to know that the next killer app is in the emerging electronic marketspaces, and it's the creation of communities."

–John Sviokla
Professor
Harvard Business School

Imagine a thriving, vital neighborhood that, oddly, hasn't a single person in sight. No, it's not a scene from the latest science-fiction bestseller. It's a virtual community—one where information is the heart and bloodline of the neighborhood. And, according to Sviokla, it's the place—or "space" as he calls it—where businesses will need to set up shop in order to thrive in the coming decade.

With the advent of the World Wide Web, we now have the infrastructure in place to have a "robust information world into which businesses can go to establish relationships with customers," says Sviokla. The challenge for CIOs is to find ways to utilize the prodigious amounts of data and content in order to build customer communities and develop new ways of communicating with these customers.

"Mutable Markets," starting on Page 68, takes a look at organizations that are successfully creating virtual marketspaces. One particularly fascinating case study is Florida State University, where the garden-variety student ID card has created a thriving, vital neighborhood. With it, students can perform an array of varied transactions that includes transferring financial aid funds, registering for classes or even ordering a pizza at a local sub shop. The benefit to the university: $300,000 in saved administrative costs alone.

Remember, information is an asset. As CIOs, you control the vertical. You control the horizontal. Your future is restrained only by the outer limits of your imagination.

P.S. Immerse yourself in a practical study of the value of IT. The fourth annual Enterprise Value Retreat, to be held Jan. 21-23 at the Arizona Biltmore in Phoenix, gives you the opportunity to meet and work with a distinguished group of business executives, senior IT practitioners, business-school leaders and heads of technology companies. By analyzing a real-life case study, participants will learn how to effectively manage the process of information technology acquisitions. For more information, please call 800 355-0246 or visit our Web site at *http://www.cio.com/conferences/enterprise.html.*

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Coming In CIO

SPECIAL ISSUE:

The Millennium Approaches

With a new century upon us and IT becoming ever-more sophisticated, more user-friendly and more accessible, we can expect an explosion of virtual businesses, organizations, industries and professional fields. What will the workplace look like? How will globalization have played out? How will companies be making money?

Already a growing number of companies exist only in cyberspace. Doctors can now use teleconferencing technology to examine maximum-security inmates at a prison 350 miles away, saving time and money while eliminating concerns about safety. And thanks to the Internet, people anywhere in the world can earn a degree from the University of Phoenix without ever setting foot in Arizona.

But as this century winds down, it means only the beginning of troubles for the timekeepers in many mainframes, and solutions to the problem of resetting the clocks in all those systems may end up costing millions. We will tell you how to deal with the time bomb that may be about to go off in your companies.

CIO's special issue takes a glimpse at the predictions of past and present visionaries and gives you a preview of the fastest-growing technologies and the challenges they pose.

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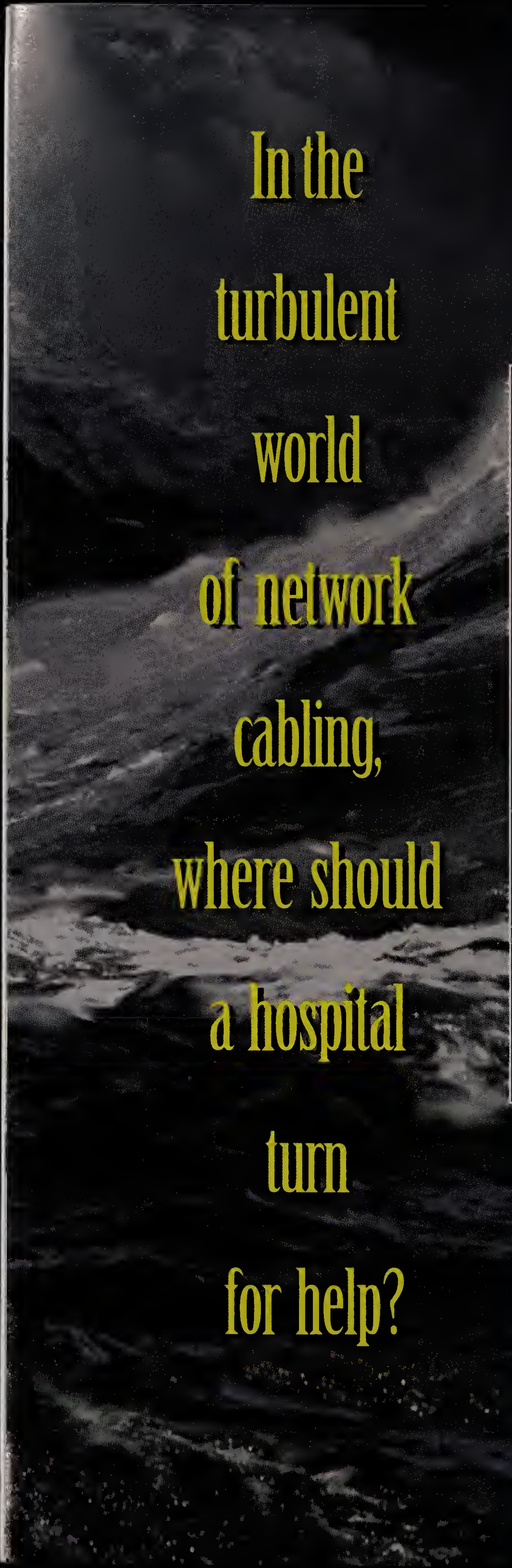

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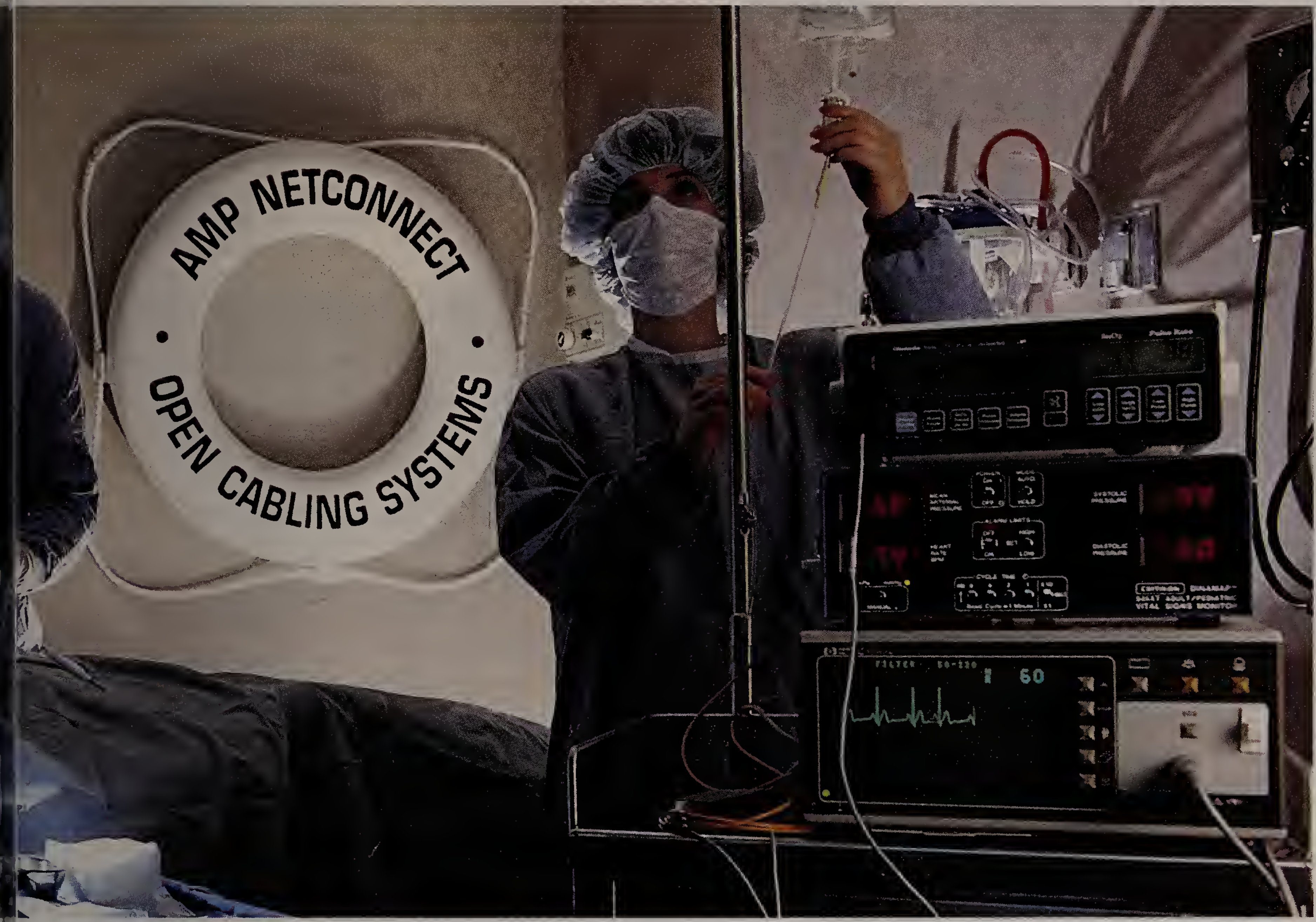

banks, universities, national retail chains, government buildings, as well as hospitals, to accommodate change and anticipate growth.

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TRENDLINES

ELECTRONIC TOLLBOOTHS

LESS-TAXING TOLLS

To relieve traffic congestion along heavily traveled corridors, a number of areas, including California, Virginia and the United Kingdom, are funding new highway projects with the help of an old business model: toll roads. But conventional tollbooths that require motorists to stop would defeat the purpose of these traffic-abatement projects. Officials in all three locations are hoping that a relatively new technology, electronic tollbooths, will provide the solution. (See related story, Page 38.)

In Orange County, Calif., 60 percent of rush-hour commuters (about 30,000 drivers) pay their way on the Foothill Transportation Corridor with Lockheed Martin IMS's FasTrak windshield-mounted electronic transponders. The devices emit radio frequency transmissions that are picked up by toll-plaza receivers and identified and recorded by PCs. When drivers motor through toll areas at highway speeds, the transponders make a brief chirping noise signaling that their toll accounts have been debited.

The system, designed and operated by Lockheed, automatically closes the books each day in about one second and creates daily reports for managers in about 15 minutes, according to Dennis Bennett, program manager for Lockheed. He adds that it has the capacity to manage at least 1 million accounts per day, which is more than enough to meet the current demand.

Each highway lane restricted to automated tolls has a dedicated 486 PC that counts cars to be sure that none sneak through without a transponder. The PCs collect this data from embedded road sensors and roadside radar units and send it to a Digital Equipment Corp. Alpha-based host at the toll plaza, which is connected to a larger centralized Alpha host. The system catches scofflaws automatically by taking digitized photos of license plates.

The first time a driver speeds through electronic toll areas without a transponder, he or she receives a "nicely worded letter" explaining the

SNOW BUSINESS

Though New England winters can be brutal, the Massachusetts Highway Department's snow and ice engineers don't dread freezing rain, snowstorms and howling wind. Thanks to a system from Finland-based Vaisala Inc., they can monitor road conditions on nine major routes in and around Boston without ever leaving their cups of cocoa and toasty-warm cubicles.

Wires buried directly underneath the roads monitor the temperature, water content and freezing point of the road surface. The wires converge in small towers resembling telephone poles on the side of the road and then carry data back to computers in the main office. If the data reveals that Route 24, for instance, is starting to ice over, an ice engineer can immediately dispatch trucks to de-ice roads with sand, salt and chemicals. Conversely, as soon as the ice begins to melt, the department can call off the trucks, thereby avoiding expensive overkill. "In the past, we had to rely on judgment calls, but now there's an accurate way of measuring what's happening on the roadways," says Chrysa Meyers, spokeswoman for the Massachusetts Highway Department. "That means we can respond more quickly."

For more information, call Vaisala at 617 933-4500.

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electronic toll system and requesting payment, says Paul Glaab, director of public affairs for the Transportation Corridor Agencies, a coalition that manages toll-road construction in Orange County. About 90 percent of drivers comply with the first letter, he says. Legislation was passed this fall to force scofflaws to pay up in order to renew their registrations, as they are already required to do with unpaid parking tickets.

About 7.5 miles of the planned 30-mile $746 million Foothill project is now open to traffic equipped with both conventional and electronic tollbooths. Commuters making use of electronic tollbooths save as much as 20 minutes each way using the toll road in lieu of freeways.

–Peter Fabris

THE HIGHWAY OF HIGHWAYS

If everyone in the transportation industry—America's largest business—convened for a conference, they'd cause quite a traffic jam. But now they can all get together online via Traffic Highway Inc. of Chicago, a private online bulletin board service that lets users ask questions, conduct research, engage in discussions and network from their own desktops. A subscription, which includes eight hours of free time, costs $49 per month. To start a free trial or for more information, call 800 804-5075.

SOFTWARE

ACCESS DENIED

Sometimes when a window opens, a door closes.

The PC revolution of the 1980s brought a wealth of employment opportunities for some 30 million people with disabilities in the United States because computers made it easier for them to see, read or speak. But the current move toward graphical user interfaces has made life anything but simple for blind and visually impaired users who rely on computers to do their jobs.

As Windows 95 replaces DOS as the standard in corporate America, a significant number of the 1 million blind or visually impaired people who are otherwise proficient at their jobs face the prospect of losing employment or opportunities for advancement, according to Jay Leventhal, senior resource specialist at the American Foundation for the Blind's technology center in New York.

"The biggest problem is that GUIs are not as accessible as text-based programs, which can be read aloud by a screen-reader program—software that sends information from the screen to an external device that translates it into speech or Braille," says Joseph J. Lazzaro, director of the adaptive technology program at the Massachusetts Commission for the Blind and author of the book *Adapting PCs for Disabilities* (Addison-Wesley, 1995). "Most of the simpler applications work well," he says. "But as programs get more sophisticated, things start to fall apart. It's like being able to get 80 percent of the way across a bridge."

Some companies whose systems utilize GUIs, such as Apple and IBM, solved the problem by providing "hooks" or entry points in the software that a screen reader can latch onto and interpret, according to Lazzaro. But Microsoft Corp., in particular, has been slow to respond to the issue of accessibility, he claims. "The heartbreak is that the problem of accessibility is not real. All that's needed is to program the computer with the right code," he adds.

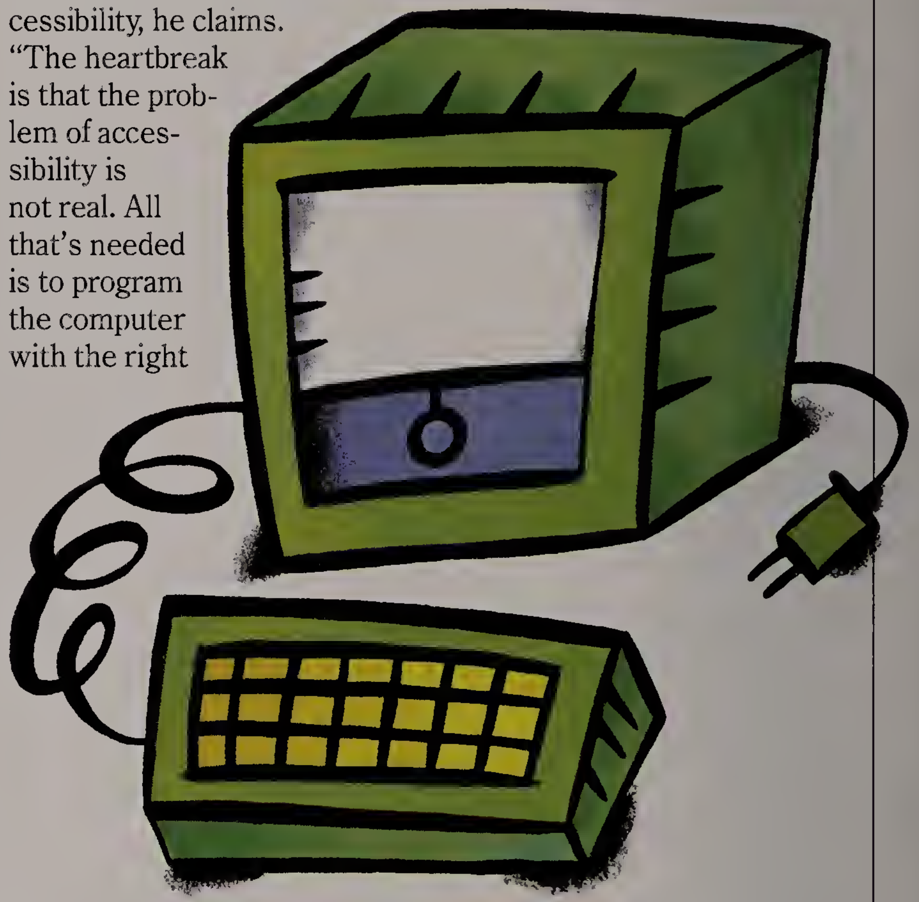

ILLUSTRATION BY MARY ANNE LLOYD

"The people at Microsoft didn't exactly ignore the problem, but they gave it scant attention at first," says Jamal Mazrui, program specialist for the National Council on Disability, a small independent federal agency in Washington. "I think that it simply didn't consider access important enough." But with pressure from various advocacy groups and government agencies—and on the heels of a threat by the Commonwealth of Massachusetts to withhold a $10 million procurement contract—Microsoft and its third-party software developers have stepped up their efforts to develop accessibility features for Windows 95 and Windows NT, according to Mazrui.

"Microsoft had a group dedicated to the accessibility issue for more than three years," says Greg Lowney, senior program manager for the accessibility and disabilities group at Microsoft, "but we were relying on third-party software vendors to produce a viable solution. The National Commission for Disabilities and other advocacy groups have driven home the message that our strategy has not yet been successful. We've begun to take a much more proactive role."

Besides funding a project to promote research and define accessibility guidelines for emerging technologies, Microsoft is defining object linking and embedding (OLE) accessibility standards that allow applications

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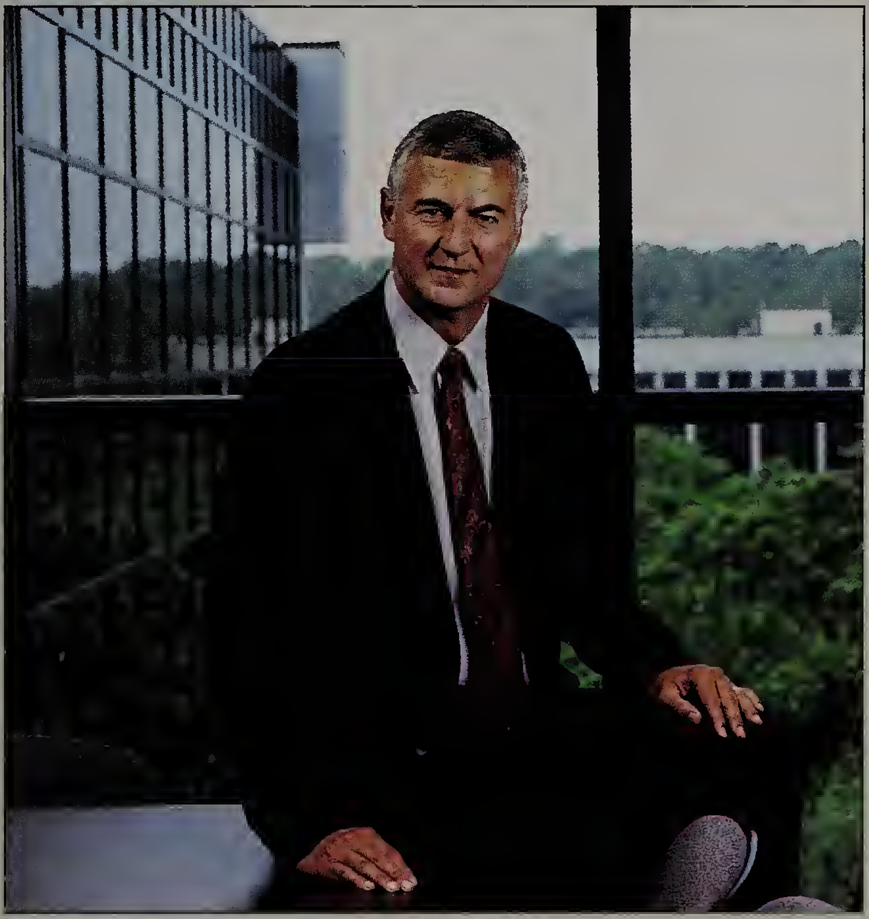

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[illegible] promotional pricing subject to change without notice.

[illegible] Lifecycle Cost Reduction Model [illegible] ings will vary based on your operation and level of [illegible] Data Corporation PC Pricing [illegible] to actively cooperate with accessibility aids. "We think it will be necessary to separate what makes an application accessible from how it is integrated," says Lowney. The company has also licensed a technology, called Off-Screen Model, that will allow independent software vendors to more easily develop accessibility aids for Windows products.

When deciding which programs to use, IS executives should take into account that some are more accessible than others. "The managers with purchasing power will help to influence vendors about what works and what doesn't," says Lowney. "But the industry still has a long way to go. It will be awhile before the impact of these initiatives is seen in the operating systems, the mainstream applications and the accessibility aids. The best we can do is move forward as fast as we can without rushing so much that we do it wrong," he says.

–Elaine Cummings

CAREER MOVES

GEORGE KENNEY, who directed the development and application of new investment technologies for Kidder Peabody & Co. Inc. and the American Stock Exchange, has joined Nicholas-Applegate Capital Management as CIO. He is responsible for enhancing and integrating the firm's operations, information systems and related technology.

Johns Hopkins University named **DAVID T. KINGSBURY** its first CIO. Kingsbury, who has been director of the university's Genome Data Base, is now responsible for coordinating and integrating all of the university's information systems. One of his first tasks is to establish a $12 million high-speed, fiber-optic enterprisewide information network.

Madge Networks Inc. appointed **RICHARD L. DIAMOND** vice president of IS and CIO for Madge Networks N.V. He is responsible for the company's worldwide information systems. Diamond was previously vice president for worldwide IS and CIO at AST Research.

Governor Pete Wilson appointed **JOHN THOMAS FLYNN** CIO of the state of California. Flynn is heading the new Department of Information Technology and is charged with carrying out the recommendations of the Governor's Task Force on Government Technology and Procurement and the Governor's Council on IT. Flynn was previously CIO for the Commonwealth of Massachusetts. ■

HERE'S THE WINDUP

When Trevor Baylis, a 58-year-old inventor from London, heard that the spread of AIDS in Africa was linked to ignorance stemming from a lack of communication, he took matters into his own hands. Baylis invented the world's first clockwork radio to spread the flow of information to the many Africans who cannot afford batteries to power their radios.

Users operate the radio, called Freeplay, by turning a handle on the side of the unit. As the spring unwinds, power is transferred through a three-stage gearbox to a small electric motor that produces enough electricity to power a standard three-band (short wave, medium wave, FM) radio circuit. Twenty seconds of winding produces about 40 minutes of playing time. The radio, which weighs roughly 7 pounds, is good for approximately 10,000 winds, or 6,000 hours of playing time. Freeplay, which is manufactured by BayGen Power Co. Ltd. of Johannesburg, lasts four to five years and sells for about $30.

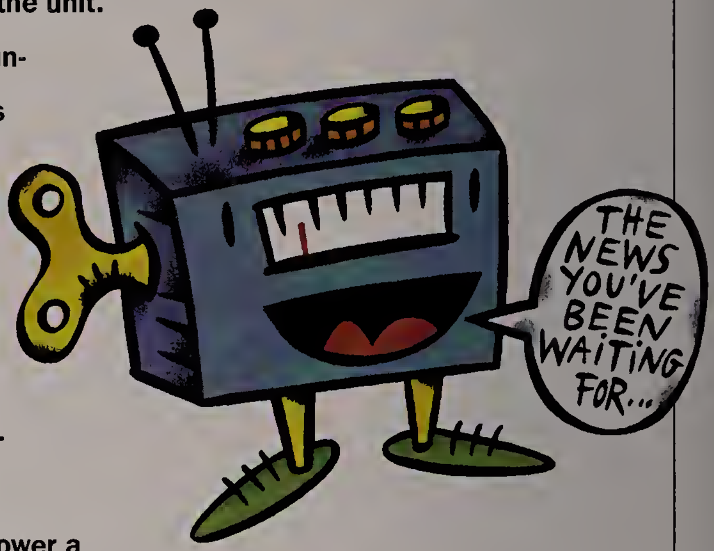
THE NEWS YOU'VE BEEN WAITING FOR...

ILLUSTRATION BY MARY ANNE LLOYD

Baylis designed Freeplay for developing nations where an affordable source of energy is often scarce or non-existent, but "the applications for this radio are as wide-ranging as anybody who needs a radio would want it to be," says BayGen's Client Services Manager Leigh Murray. Development organizations want to distribute Freeplay in war zones such as Bosnia and Rwanda to enable information about relief convoys and medical facilities to be transmitted to areas where electricity is cut off and batteries are hard to come by. U.S. environmentalists have also expressed interest in Freeplay because it avoids the pollution that results from the disposal of large stocks of batteries, which may leak when buried.

BayGen plans to expand its clockwork line into new arenas, such as flashlights, calculators and portable phones. For more information, call BayGen at 011-27-11-487-3076. ■

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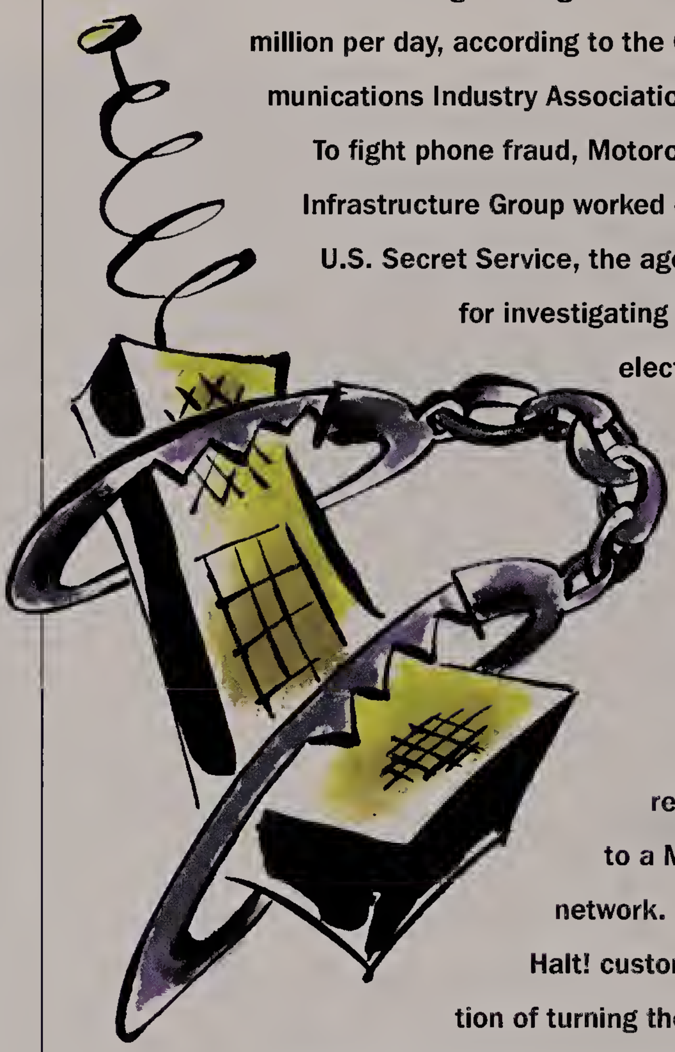
TRENDLINES

To Catch a Thief

Although cellular phone service may be an unavoidable cost of doing business, paying for someone else's calls needn't be. When criminals use "cloned" phones, or wireless telephones they've illegally programmed with a stolen account code, legitimate customers get charged—to the tune of $1.5 million per day, according to the Cellular Telecommunications Industry Association.



To fight phone fraud, Motorola Inc.'s Cellular Infrastructure Group worked closely with the U.S. Secret Service, the agency responsible for investigating telephone and electronic fraud, to develop a product that stops fraudulent calls before they can be made. Halt! is available to customers currently subscribing to a Motorola cellular network.

Halt! customers have the option of turning their accounts on and off via a personal identification number (PIN). The product also requires callers to enter a PIN before they can dial numbers from a predetermined list that includes 900 numbers and international area codes. If the PIN fails, the subscriber record is marked as fraudulent, and those callers must use a PIN for all future calls until further investigation. In that case, the customer service department within the network operator's domain will contact the subscriber to determine whether a fraudulent call was being attempted or whether that caller simply had trouble remembering the PIN. Halt! also detects when more than one phone with the same account number is attempting to access the system. In such cases, Halt! requires the subscriber to enter a PIN prior to all calls until further investigation.

For more information, call Motorola at 708 632-4691.

EVENTS

DB/EXPO '95: Database, Client/Server, Networking and Parallel Warehousing Exposition and Conference

Dec. 4–8
Jacob K. Javits Convention Center, New York
Blenheim NDN Inc.
800 2DB-EXPO or 415 966-8440

This conference, which features more than 200 industry experts and users, is organized into three separate programs: database and client/server development, data warehousing and parallel computing, and industry and marketing updates for IT executives. A concurrent exposition will feature more than 500 exhibits from leading software and hardware vendors.

Registration: $495–$1,595

How to Align IT with Corporate Strategy: Maximizing IT Capabilities to Maintain a Competitive Advantage

Jan. 16 & 17, 1996
Atlanta Airport Hilton, Atlanta
International Quality & Productivity Center
800 420-2145 or info@iqpc.com

Topics covered will include using IT to facilitate corporate change, developing a global support strategy for IT, aligning client/server computing with business goals and using the Internet to improve customer service.

Registration: $1,195–$1,795

Building and Developing Key Data Warehousing Strategies

Jan. 23–25, 1996
Fairmont Hotel, Dallas
Global Business Research Ltd.
800 868-7188

Attendees will learn how to harness unstructured data, decrease response time and predict customer buying patterns. A preconference workshop will focus on online analytical processing (OLAP); a postconference workshop will cover finding hidden trends and patterns in data for competitive advantage.

Registration: $1,295

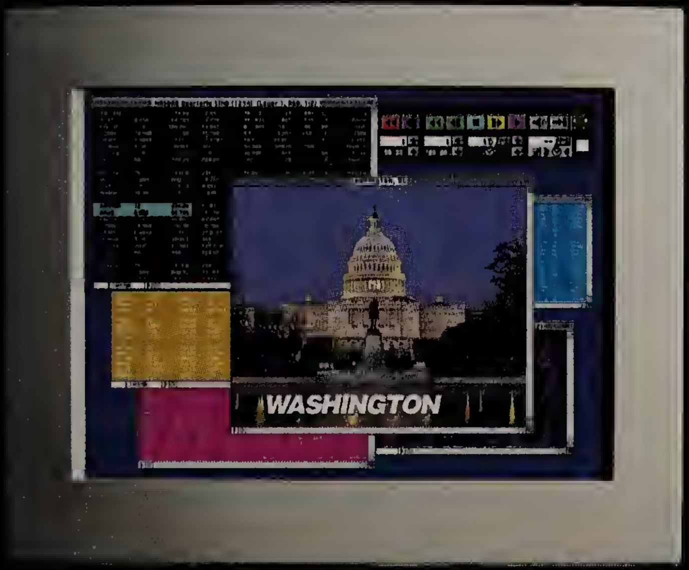
New Inklings

Implementing X.400 Backbones, a 450-page research report from Ferris Research of San Francisco, offers an analysis of all phases of implementing an X.400 backbone within a large organization. The report covers practical issues of design and maintenance of such a backbone, explains the technology involved and assesses various X.400 products. For more information or to purchase the report, which costs $1,495, contact Ferris Research at 415 986-1414 or *http://www.ferris.com.*

The Freeware Hall of Fame Guide to Free Software by Rey Barry describes 1,743 programs that are free of charge for personal use and tells how to find them on the Internet and neighborhood bulletin boards. The $20 guide is available from the Freeware Hall of Fame, 1561 Dairy Road, Charlottesville, VA 22903-1303.

ILLUSTRATION BY BETHANY GULLY

HOW WALL STREET'S SMARTEST BROKERS MAKE SURE THEIR INVESTMENTS NEVER GO DOWN



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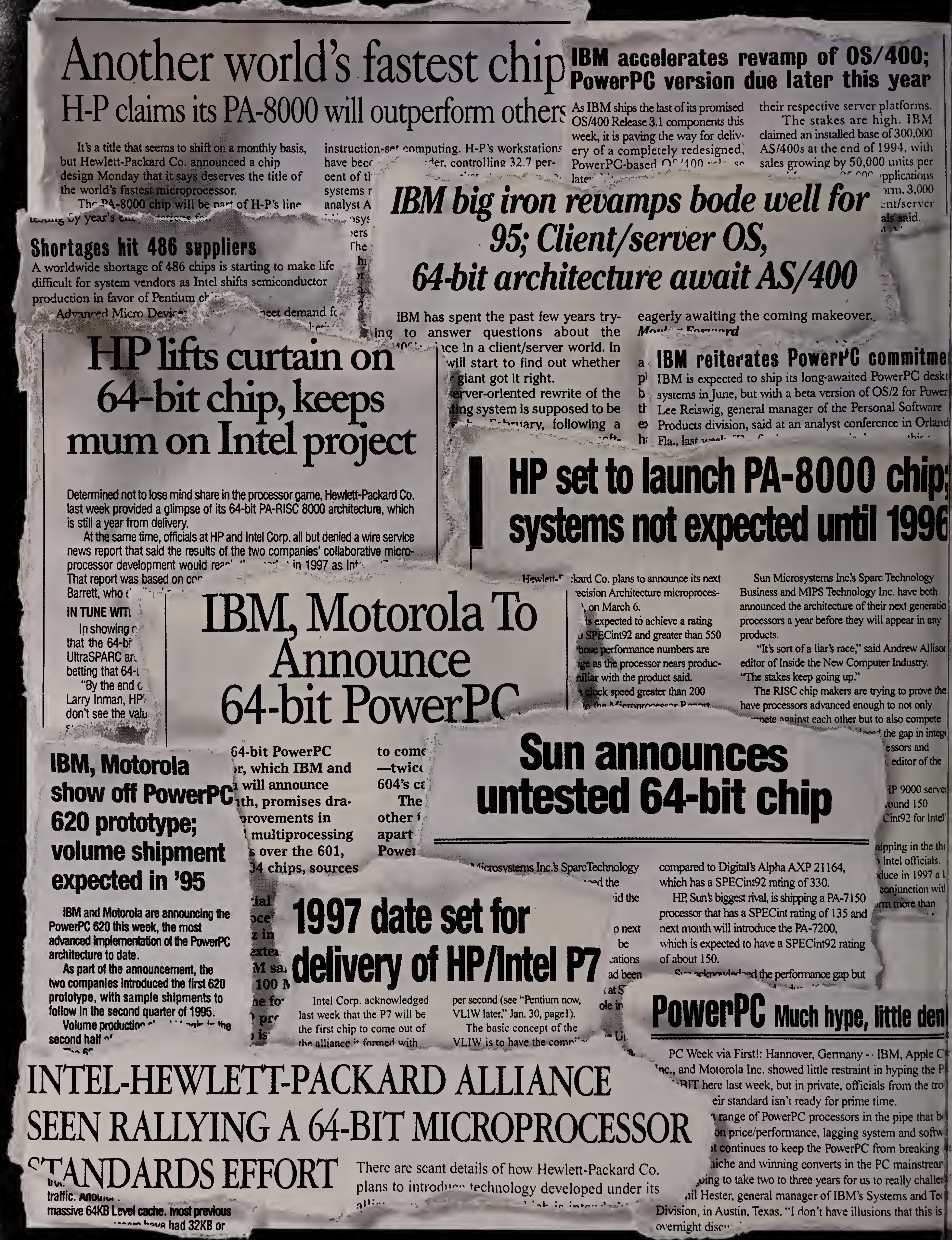

Another world's fastest chip

H-P claims its PA-8000 will outperform others

It's a title that seems to shift on a monthly basis, but Hewlett-Packard Co. announced a chip design Monday that it says deserves the title of the world's fastest microprocessor.

The PA-8000 chip will be part of H-P's line

instruction-set computing. H-P's workstations have bee

der, controlling 32.7 per-

cent of t

systems

analyst A

IBM accelerates revamp of OS/400; PowerPC version due later this year

As IBM ships the last of its promised OS/400 Release 3.1 components this week, it is paving the way for delivery of a completely redesigned, PowerPC-based OS/400

their respective server platforms.

The stakes are high. IBM claimed an installed base of 300,000 AS/400s at the end of 1994, with sales growing by 50,000 units per

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ent/server

als said.

Shortages hit 486 suppliers

A worldwide shortage of 486 chips is starting to make life difficult for system vendors as Intel shifts semiconductor production in favor of Pentium ch

Advanced Micro Devic

eet demand f

IBM big iron revamps bode well for 95; Client/server OS, 64-bit architecture await AS/400

IBM has spent the past few years trying to answer questions about the

ce in a client/server world. In

will start to find out whether

giant got it right.

erver-oriented rewrite of the

ting system is supposed to be

February, following a

eagerly awaiting the coming makeover.

IBM reiterates PowerPC commitme

IBM is expected to ship its long-awaited PowerPC deskt systems in June, but with a beta version of OS/2 for Power Lee Reiswig, general manager of the Personal Software Products division, said at an analyst conference in Orland Fla., last week.

HP lifts curtain on 64-bit chip, keeps mum on Intel project

Determined not to lose mind share in the processor game, Hewlett-Packard Co. last week provided a glimpse of its 64-bit PA-RISC 8000 architecture, which is still a year from delivery.

At the same time, officials at HP and Intel Corp. all but denied a wire service news report that said the results of the two companies' collaborative microprocessor development would rea

in 1997 as Int

That report was based on co

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UltraSPARC ar

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Larry Inman, HP

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HP set to launch PA-8000 chip; systems not expected until 1996

Hewlett-P ckard Co. plans to announce its next

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on March 6.

is expected to achieve a rating

SPECint92 and greater than 550

hose performance numbers are

ge as the processor nears produc-

iliar with the product said.

clock speed greater than 200

Sun Microsystems Inc.'s Sparc Technology Business and MIPS Technology Inc. have both announced the architecture of their next generatio processors a year before they will appear in any products.

"It's sort of a liar's race," said Andrew Allisor editor of Inside the New Computer Industry. "The stakes keep going up."

The RISC chip makers are trying to prove the have processors advanced enough to not only

ete against each other but to also compete

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IBM, Motorola To Announce 64-bit PowerPC

64-bit PowerPC

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IBM, Motorola show off PowerPC 620 prototype; volume shipment expected in '95

IBM and Motorola are announcing the PowerPC 620 this week, the most advanced implementation of the PowerPC architecture to date.

As part of the announcement, the two companies introduced the first 620 prototype, with sample shipments to follow in the second quarter of 1995.

Volume production

second half

Sun announces untested 64-bit chip

icrosystems Inc.'s SparcTechnology

compared to Digital's Alpha AXP 21164, which has a SPECint92 rating of 330.

HP, Sun's biggest rival, is shipping a PA-7150 processor that has a SPECint rating of 135 and next month will introduce the PA-7200, which is expected to have a SPECint92 rating of about 150.

the performance gap but

1997 date set for delivery of HP/Intel P7

Intel Corp. acknowledged last week that the P7 will be the first chip to come out of

per second (see "Pentium now, VLIW later," Jan. 30, page1).

The basic concept of the VLIW is to have the com

PowerPC Much hype, little den

PC Week via First!: Hannover, Germany - - IBM, Apple C

nc., and Motorola Inc. showed little restraint in hyping the P

BIT here last week, but in private, officials from the tro

eir standard isn't ready for prime time.

range of PowerPC processors in the pipe that b

on price/performance, lagging system and softw

t continues to keep the PowerPC from breaking

iche and winning converts in the PC mainstrea

oing to take two to three years for us to really challe

il Hester, general manager of IBM's Systems and Te Division, in Austin, Texas. "I don't have illusions that this is overnight disc

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INTEL-HEWLETT-PACKARD ALLIANCE SEEN RALLYING A 64-BIT MICROPROCESSOR STANDARDS EFFORT

There are scant details of how Hewlett-Packard Co. plans to introdu technology developed under its

traffic.

massive 64KB Level cache. most previous

had 32KB or

IT'S NICE TO SEE IBM AND HP FIGHTING OVER WHO WILL BE NUMBER 2.

In fact, it's downright heartwarming. Digital, of course, beat both of them to 64-bit computing long ago. And while neither one has a 64-bit machine to sell you, we're now on our second generation of 64-bit Alpha-based workstations and servers. Machines that offer price/performance leadership at every level. For example, our new AlphaStation™ 250 system is half the price of the comparably performing HP workstation.[1] While our new AlphaServer™ 8200 and 8400 systems are the first and only servers capable of running the newest 64-bit database products—letting your application directly address up to 14GB of data in main memory, and giving you performance gains of up to one hundred times over 32-bit enterprise systems. Alpha-based systems run thousands of applications—including the ones you need most. And, thanks to the enormous capacity and scalability of 64-bit architecture, they'll work with your present equipment, and grow almost limitlessly as your business grows. Sure, it's possible that HP or IBM really will have 64-bit machines, eventually. But even when they start offering real-world 64-bit products, it'll still be years before they'll have been as thoroughly tested and evolved as ours are right now. So why wait? Whatever your business, whatever your budget, you can do what thousands of companies all over the world have done—and what IBM and HP have been unable to do—have a 64-bit computer you can call your own. For more information, contact your Digital business partner. Or call 1-800-DIGITAL. Or reach us via our Internet address: moreinfo@digital.com.

Digital's lucky chip

...sales of systems based on the Alpha chip have taken off, jumping 66% in the past year, and now exceed VAX sales. The chip excels at handling thousands of concurrent users–which is why regional phone companies

Digital Ships Its 100,000th Alpha System

Digital Equipment Corp. reports it shipped its 100,000th 64-bit Alpha system. The milestone is significant, in our opinion, in that competitors IBM, Sun, and Hewlett-Packard have yet to ship their first 64-bit product.

digital™

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[1] As of 6/6/95.

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AAL

Wizard of Odds

A crisis in customer confidence convinced Equitable to scrap an existing system and start from scratch. Was it a gutsy move or a strategy for survival? Or both?

BY EDWARD HAYES

In February, 1991, Equitable Life Assurance company was facing an information crisis and, with it, a crisis in public confidence. Our company and others in the insurance industry had been cited in the business press for overall poor financial status. Standard & Poor's and Moody's downgraded Equitable's credit rating. Customers panicked, withdrawing from their accounts in droves. To make matters worse, New York-based Equitable had been preparing to go public, making public confidence an imperative.

The plan that ensued to reengineer client services was described by some as a project of "biblical proportions." That may have been an understatement. Equitable's Pension Annuity Recordkeeping Information System (PARIS), which provides record keeping for $14 billion in assets for more than 750,000 retirement plan participants and processes upward of 30,000 transactions and 3,500 inquiries daily for IRA, Keogh, 401(k), 403(b) and several other annuity submarkets, was a year-long high-stakes undertaking.

ILLUSTRATION BY SETH JABEN

The existing information system, developed in the 1970s, accommodated only five investment funds. It was clear that customers wanted many more choices. But a redesign of the existing system would have required 95 percent of the code to be rewritten while accommodating only four more investment choices. The company's record-keeping system, then supporting only five investment funds, needed the capacity to grow beyond 20. Our existing system could not give us that kind of record-keeping and reporting capability.

If that weren't enough, the system's slow response time was a further impairment. An online inquiry took an average of 45 seconds to complete, much too long when less than two seconds was standard in the industry. Even worse, 60 percent of the calls to our toll-free line went unanswered. Add to that a 45-second wait once customers did reach us, and you can imagine the tremendous competitive disadvantage we were facing. It was obvious to us that an entirely new system would be necessary.

Our initial analysis yielded three systems that showed promise but were incapable of handling the high volume (800,000 to 1 million policies) we were projecting to have by the end of 1997. A team made up of IS and operations personnel visited with Dreyfus, Vanguard and Dean Witter, who showed us how they were able to customize SunGard's OmniPlan software for their 401(k) and individual IRA record keeping. After those demonstrations, we were convinced that we could also customize the software to meet our needs. We headed off to SunGard in Birmingham, Ala., where we were able to test the code, process some account contributions and withdrawals, and examine financial reporting functions. Before long, we felt comfortable that OmniPlan running on our IBM mainframe system would be a good choice for our business.

As head of both annuity operations and annuity IS at the time, I pitched the $14 million plan to Joe Melone, Equitable's president. The company had already endured a $100 million operating system development failure due to mismanagement. When a project of that magnitude fails, those in charge are often ushered out the door. The company—and I—could not afford another fiasco.

When managing a high-stakes project like this, an atmosphere of cooperation and mutual respect is key. If the team doesn't have the expertise to tackle a certain technical problem, they may need the support of an outside specialist. Most important, as project leader, I felt that it was important to be present during those long nights and weekends when the nitty-gritty coding was underway. That required a lot of patience and mental stamina, but I wanted to show the team that I cared as much about the project as they did. It was clear that bullying and intimidation were not management techniques that would work in this situation.

Unlike most financial management firms, we house 10 submarkets within our one main annuity product, Equi-vest. Now, we support each of them with PARIS. Such an integrated approach creates coding challenges when, for example, changes in IRS rules must be encoded on a single system for each individual submarket. But doing so requires less manpower and fewer test modifications than would 10 separate systems. It also enables us to generate one report format from a single system for customers with holdings in 401(k), TSA and IRA accounts.

Coders, systems and business analysts and project managers worked on the PARIS project. As development team leaders, Don Buskard, vice president of pension and annuity systems development group, and I both realized that it was important to have business and systems analysts available to everybody. That was apparent when we redesigned confirmation notices. We didn't want our systems people redesigning the forms so radically that they would seem unfamiliar to customers. Operations people worked with systems personnel to keep the forms close to the familiar documents with which customers were comfortable.

The development team met frequently—daily for the first three months and weekly thereafter—in order to ensure that the project stayed on track and on schedule. For purposes of customization, we kept a SunGard employee who was intimately familiar with the code on hand for the duration of the project, a piece of advice from the folks at Dean Witter that turned out to be right on the mark.

We made tough decisions to meet deadlines. When we designed a slick front-end interface for customer inquiry support, for instance, our customer representatives wanted it to support monetary transactions as well. But doing so would have put us beyond our one-year deadline, so we opted to delay that part of the project.

In the end, at least 100 people spent long nights at work, including 40 Saturdays and 23 Sundays. The team created more than 3 million lines of Cobol code in 12 months. It was the company's biggest project of the past 20 years and was delivered on time and on budget.

Although it was a risky endeavor, particularly for Don and me, it was an essential project that was a part of helping the company get back its *grand* image. PARIS allows us to process cash and confirm transactions faster, support up to 99 investment choices and offer dollar-cost averaging, systematic withdrawals and automated phone transactions. Equitable has increased its customer base from 550,000 to 757,000 and is back on sound financial footing. In the long run, not taking the gamble would have been the riskier move.

Edward Hayes is a vice president at Equitable and oversees the administration office of annuity operations.

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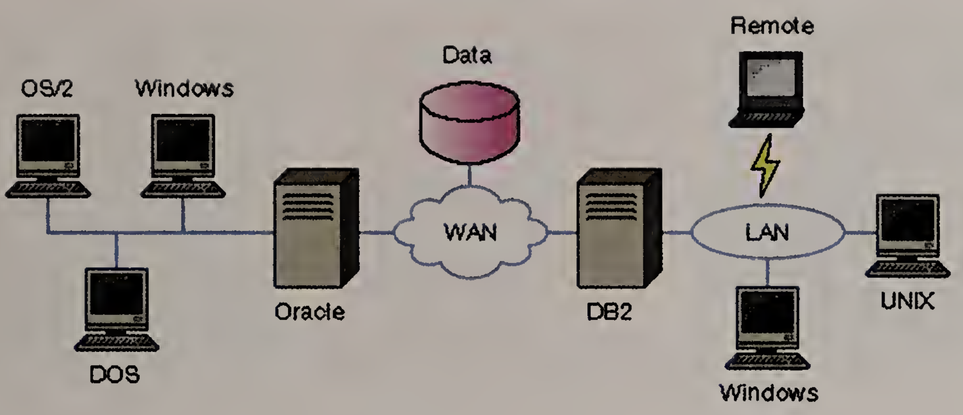

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Fail Safe

At a recent conference, CIOs discover that real learning means never having to say you're sorry

BY CHRISTOPHER KOCH AND PETER FABRIS

In the years before his death, quality guru W. Edwards Deming could no longer bring himself to utter the words that described the very movement he had singlehandedly created: total quality management. "Deming believed those words had lost all their meaning," said Peter Senge, author of *The Fifth Discipline* and a man behind a movement of his own. "And, likewise," he continued, "if we don't start to think about what learning and knowledge really mean, then all of this hullabaloo about the learning organization will become just another fad that runs its course in a few years."

As the keynote speaker at "The Psychology of IT: The CIO's New Mindset," the CIO Perspectives conference in October, Senge cautioned that learning is "not some jazzed-up way of sharing information." Rather, he said, it is the trial-and-error process that enhances knowledge, which he defined as "a capacity for effective action."

PETER SENGE *encourages attendees to learn from their mistakes.*

The image of learning that springs to mind when we see or hear the word—stuffy schoolrooms with students silently listening to a teacher—is precisely how to *stop* learning, Senge told the group of 640 IS executives gathered at the Hyatt Grand Cypress in Orlando, Fla., for CIO's largest-ever conference. The approach to learning that caused us all to rush for the seats in the back of the classroom out of fear of making mistakes carries over to our professional lives, where we spend much of our time evading tough issues in meetings and avoiding mistakes for which we fear we'll be punished.

"In order for real learning to take place, you have to struggle with feeling incompetent and ignorant," said Senge. It's like picking up a golf club for the first time and recognizing the extraordinary amount of errors you'll make before gaining mere competence at the game. "Unless it's something you care about, you won't learn. Otherwise, why would you risk going through all that?"

In most organizations today, unfortunately, it is desperation—and not inspiration—that promotes learning, according to Senge. Yet, crisis and fear can only go so far as a motivation for learning. One need only look back to our most effective period for learning—from infancy through childhood—for proof. "If we had waited for a crisis to learn to walk, we'd all still be sitting on our butts," joked Senge. "Kids learn because they want to, not because they have to."

Indeed, children, who learn best when they can play without fear of making mistakes or being punished, provide the clearest clues to effective learning. This atmosphere of experimentation and "psychological safety" is missing from most organizations today, where the work of the day and a relentless emphasis on efficiency and quality prevent us from trying new things.

How do we design our organizations for learning? Some prototypes are beginning to emerge from Senge's work with the Center for Organizational Learning at MIT's Sloan School of Management in Cambridge, Mass. At Ford Motor Co.'s Lincoln Continental division, management created a team-based environment for a new-car development project that focused on creating a safe environment for learning. The team created a sophisticated "learning lab" with facilities explicitly aimed at experimentation that was close to but separate from the day-to-day workspace. The facilities, along with a coaching and mentoring

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If you think "veronica" and "archie" are comic strip characters, you have a lot of reading to do.

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program, created opportunities to experiment with car design without fear of failure (a condition of the learning lab was that no final decisions on the car's design would be made there). "It's about practice," said Senge. "Practice reduces the cost of making mistakes. Can you imagine an orchestra or a football team that didn't practice?"

According to Senge, the learning lab helped the team finish the car design a year early, without the last-minute modifications that usually accompany a prelaunch. Despite the group's success, Senge admits that creating learning environments such as Ford's lab are not easy. "Slack time is needed for learning, yet most managers don't see the value of it," he said. "Until there's a critical mass of line leadership that can redefine the work setting, learning won't happen."

But work setting alone is not enough to ensure success. Given the increasing prevalence of team-based work, more thought needs to be given to the collaborative impact of the different personalities of the various team members, according to another speaker, Gerald Macdaid, CEO of the Center for Applications of Psychological Type. Companies normally consider the team selection process based on factors such as job role or seniority and ignore the core personality types of the people on the team. Macdaid outlined how personality types fall into diverse categories that remain basically stable throughout adulthood, as evidenced by the Myers-Briggs personality test. "In an absence of knowledge of different types of personalities, we push people to behave more like ourselves," said Macdaid. That can cause polarization rather than cooperation. "Knowing an individual's personality type is valuable in teams and will help team members learn to deal with each other," he added.

The goal of understanding personality types is better communication. The inability of IS and the business to communicate effectively costs companies millions of dollars each year in failed systems and reworking, noted conference moderator Jim Wetherbe, director of the MIS Research Center at the University of Minnesota. Simply asking business managers what they want from a new system isn't enough, argued Wetherbe, because they usually don't know. "When we don't get the requirements right for a new system, it costs 50 to 100 times more to modify it once it's in place," he said. "Most system 'enhancements' result from a failure to identify requirements in the first place."

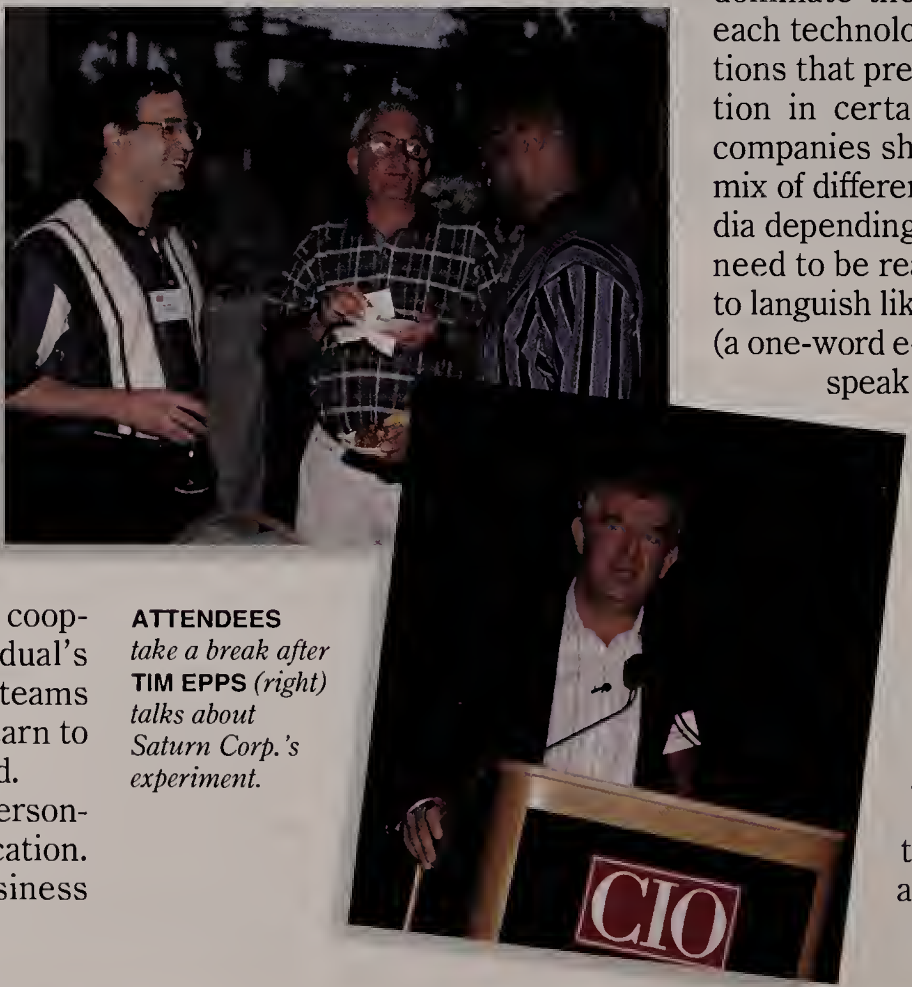
> **"In order for real learning to take place, you have to struggle with feeling incompetent and ignorant."**
>
> *–Peter Senge*

It's critical for IS to conduct structured interviews to find out what managers need from systems. "Psychotherapists don't ask their patients what type of therapy they'd like," Wetherbe explained. "They ask them things like, 'Are you happy?' They craft their questions carefully to find out what patients need." A structured interview for business managers would include a cross-functional examination of the key problems they face, followed by an inquiry into how they go about making decisions. Finally, IS needs to understand the critical success factors that affect the business.

From these lines of inquiry should emerge a picture of how the new system needs to operate across the company. As soon as the overall picture is clear, IS should begin prototyping jointly with the business to work problems out of the system early rather than after the final version is finished. Joint application development is difficult, according to Wetherbe, but it is the key to creating truly effective rather than merely efficient systems.

The same kind of effectiveness is desired—but rarely achieved—from companies' communications systems, noted William R. Pape, CIO of VeriFone Inc. It's ill-conceived for companies to allow one particular type of communications medium—such as e-mail or voice mail—to dominate the organization because each technology has inherent limitations that prevent good communication in certain situations. Instead, companies should offer employees a mix of different communications media depending on immediacy (does it need to be real-time, or can it afford to languish like e-mail?); interactivity (a one-word e-mail among friends can speak volumes, but strangers may need something more evocative like videoconferencing); confidentiality (e-mail isn't safe, says Pape); mobility (if you don't know where someone is, you have to use a tool that isn't based on geography); and cost.

In addition to facilitating appropriate usage of communications



ATTENDEES *take a break after* **TIM EPPS** *(right) talks about Saturn Corp.'s experiment.*

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tools, CIOs must adopt a new mindset to help their companies thrive in the era of the internetworked business.

This mindset should reflect the impact of trends such as the emergence of "smart" products, digitization, integration and internetworking, as well as the convergence of computers and telecommunications, said speaker Don Tapscott, president of New Paradigm Learning Corp. and author of *Paradigm Shift: The Promise of Information Technology.* In his new book, *The Digital Economy,* which conference attendees received before its official release, Tapscott argues that new technology will radically transform the business world. CIOs have much to consider as the IT industry is restructured and hardware and bandwidth become commodities.

In such a world, businesses have to rethink their raison d'être. For example, Encyclopaedia Britannica Inc., the number-one selling encyclopedia in the world for years, was overtaken by electronic encyclopedias from Microsoft Corp. and Grolier Inc. last year, he said. Realizing that the market for traditional encyclopedias was shrinking rapidly, Britannica published its own electronic version on the World Wide Web. With links within subject areas to other Web sites, "Britannica is now a directory of human knowledge," he said.

Tapscott also predicted that learning will become a strategic imperative in the emerging business climate. Yet he noted that business-process reengineering, when used as a euphemism for downsizing, is at odds with the need to create organizations conducive to learning.

Creating such environments will be essential in order for businesses to learn to stop thinking of market share and begin focusing on customer share, recommended Don Peppers, president of 1:1 Marketing, Businesses should strive to build enduring relationships with individuals rather than target market segments, according to Peppers. To learn about customers and encourage their loyalty, he said that companies need to establish an ongoing dialogue with them to keep track of their evolving needs. Companies should consider a customer's potential business over many years as well as his current activity. Such an approach can lead companies into new business opportunities.

"It's an old-fashioned kind of marketing," said Peppers. Although personalized service has been the norm for most of the history of civilization, he noted that "there was a temporary blip because of assembly lines." Today's powerful, robust database systems provide the means to return to the kind of attentive personalized service Peppers experiences at a hotel chain that knows him well enough to automatically put ice in his white wine when he orders a glass from room service.

Ultimately, the most important asset for many businesses will be customer information itself, Peppers said. Levi Strauss & Co.'s customized jeans concept, which enbles women to be measured in retail stores and receive a personally tailored garment a few weeks later, is a case in point. Levi retains ownership of customers' measurements and other relevant data, he said. In the future, the company may create a national data service to enable other clothing manufacturers to provide mass-customized clothing. A customer will have her measurements taken once, and then any garment manufacturer with access to the database can create custom-tailored clothes for her. With such a business model, the owner of the data holds an invaluable asset.

The imperative to learn more about customers provides a prime opportunity for CIOs to guide corporate strategy, said speaker Barton Goldenberg, president of ISM Inc. In fact, CIOs may be uniquely poised to lead cross-functional teams for many major projects involving organizational change. "As a result of dealing with managers across business units, I had the functional perspective that heads of individual business units didn't have," said Patrick Zilvitis, vice president of corporate IT for The Gillette Co., while explaining the company's ongoing process improvement efforts. These processes include consolidating the supply chain and encouraging business groups to adopt similar IT systems.

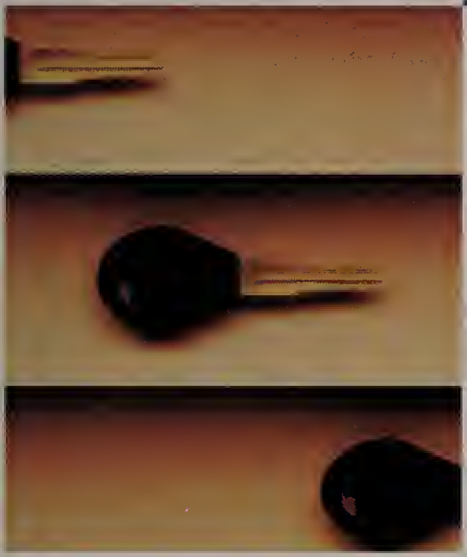
When managing cross-functional efforts, old management paradigms are best left behind, asserted Tim Epps, vice president of people systems for Saturn Corp. The 10-year-old car maker "trashed the traditional organizational table" when the company was established by General Motors Corp. in part to experiment with a new business model. To create the future requires foresight, Epps said, and that doesn't necessarily come from executive management. That's one reason the company has engineers working side by side with factory workers.

A consensus among the conference's guest speakers emerged: In a learning organization, ideas can come from all levels. Thus, the CIO's new mindset should take that—along with the need to partner with other departments—into account. In a business environment in which today's best practices could be obsolete in a few years, fostering an environment that encourages idea generation throughout the organization—and thus enhances the "capacity for effective action"—is vital for growth, perhaps even for survival.

Legacy Renewal

Object Orientation

Enterprise Integration



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MARION WATERS: *preparing for an onslaught of Olympic traffic in Atlanta with an Advanced Transportation Management System*

In cities beset by traffic snarls, building new roads just makes matters worse. But technology can pave the way for a smoother commute.

The Highway PATROL

BY PETER FABRIS

It's July 1996, and the overcooked asphalt of sweltering Atlanta offers up mirages of wavering heat vectors. The world's top long-distance runners do their stretching exercises, limbering up for the start of the Olympic marathon. Meanwhile, on the outskirts of town, a hundred thousand families pile into their minivans, headed for the city to witness this once-in-a-lifetime local happening. Fifteen thousand journalists leave their downtown hotels and jump into yellow cabs, and 1 million visitors crowd onto shuttle buses, all bound for various Olympic venues. Another 35,000 dignitaries, sponsors and officials ease into waiting limos. As the marathon starter's gun fires, they all come to a simultaneous, screeching halt on the city's streets and freeways.

To prevent that nightmare scenario and improve traffic flow long after the athletes pack up their sneakers and leave, the Georgia Department of Transportation is counting on an integrated $130 million Advanced Transportation Management System (ATMS) now under construction. As in Los Angeles in 1984, the Olympic Games provide a prime opportunity to test the latest traffic-management technology. Replete with fiber-optic cables, video cameras and interactive computers to monitor and control traffic flow and provide information on public transportation and air travel, Atlanta's system will be the most advanced in the nation.

Atlanta's heavy emphasis on technology as a transportation logistics tool for the 1996 Summer Olympics is the latest signpost that more and more traffic-clogged cities around the world will follow in exorcising their traffic demons with IT. Until recently, prevailing strategies to relieve vehicle congestion in metropolitan areas were to build more roads and widen existing ones. Unfortunately, those methods often backfire. New highways tend to draw more development and subsequently more traffic. If you build them, they will come—and come and come and come. Because many Americans have a stubborn aversion to mass transportation, better traffic management may be the only practical way to unjam traffic.

PHOTO BY SONNY WILLIAMS

"The technology is there. The problems are how to finance it and how to get communities to work with each other."

–Richard John

The arsenal of technology tools and techniques to grease the flow of auto traffic are both overt and covert. New York drivers who cross the Hudson via the Tappan Zee Bridge no doubt have noticed the electronic tollbooths that read electronic tags, automatically recording toll fees as vehicles pass through without stopping. Cities like Dallas, which has one of the country's most advanced traffic systems, use techniques less apparent to the driving public, including magnetic sensors embedded in road surfaces and highway video cameras to feed real-time traffic data to a central operations center. Traffic operators at such centers dispense traffic updates via telephone recordings, radio, television and the World Wide Web, alerting commuters to bottlenecks. And with real-time traffic monitoring and computerized traffic-signal systems, they can adjust traffic-light intervals throughout the day, making vehicles move more efficiently.

In other communities, transportation authorities are testing rule-based systems that suggest a response plan to quickly clear an accident scene and inform commuters to choose alternate routes. In addition to possibly saving lives, quicker response times from emergency crews and shorter delays in relaying information on trouble spots to other drivers will slim the chance of the dreaded rubbernecking, sit-in-traffic-seemingly-forever syndrome that strikes whenever you most need to get somewhere on time. Decreasing the amount of time vehicles run idle also reduces smog—an important payoff, given government mandates to improve air quality.

Despite these benefits, to date few communities have placed high priority on deploying the most advanced traffic technology infrastructure. "There are pockets of expertise," says Gary Ritter, Intelligent Transportation Systems (ITS, a term used interchangeably with ATMS) program coordinator with the John Volpe National Transportation Systems Center, a U.S. Department of Transportation research facility in Cambridge, Mass. Transportation departments, charged with maintaining roads and bridges first and foremost, are not noted for their high-tech proficiency, he says. In addition, spending money on a largely unseen IT infrastructure is not as politically appealing as road construction that is clearly visible to taxpayers. A state-of-the-art traffic system for a medium-size metropolitan area costs as much as $300 million to construct from scratch, Ritter notes. "That money could pay for a major bridge or six or seven miles of a freeway." Although an electronic traffic-management system could very well do more to relieve congestion than a new stretch of highway, it's often easier to generate public support for the highway.

Attitudes about traffic-management technology are changing, however, and the U.S. Department of Transportation has encouraged this process. In January 1995, the department published a 400-plus-page book of one- and two-page summaries of smart highway projects under its sponsorship. If successful, these projects could pave the way for more widespread IT-based traffic management. "The technology is there," says Richard John, the Volpe Center's director. "The problems are how to finance it and how to get communities to work with each other." Traffic-management systems function best when coordinated with those in surrounding areas, but IT sophistication varies greatly even in adjoining jurisdictions. Atlanta, Los Angeles and Montgomery County, Md., are three metro areas where such coordination is already well underway.

High-Tech Traffic Updates

Nipping potential traffic snarls in the bud depends in large part on encouraging drivers to steer clear of trouble spots. Many cities are experimenting with new ways to disseminate traffic reports, such as posting near real-time traffic updates on the World Wide Web with road maps that indicate traffic speeds. For example, the Seattle Wide-area Information for Travelers (SWIFT) project will test delivery of traveler information over FM sub-carrier waves via three devices: the Seiko Corp. Receptor Message Watch, a Delco Electronics vehicle navigation unit and an IBM Corp. portable computer. Commuters will be able to get traffic updates in their cars—or they can use the devices at home so that they can either "set the snooze alarm and sleep a little later, take an alternate route or take a bus rather than waiting in line in traffic," says Pete Briglia, ITS project program manager with the Washington Department of Transportation.

Traffic Shouldn't Be an Olympic Event

Atlanta

When 2.1 million Olympic guests share the roads with some 2.8 million Atlantans next summer, the potential for Olympic-size traffic headaches is enormous. Although the Olympics added a sense of ur-

HECTOR OBESO: *making it easier for Los Angeles drivers to bypass traffic tie-ups*

gency to Atlanta's ATMS project, the state had planned to implement it even if the city hadn't been awarded the Games, says Marion Waters III, state traffic operations engineer. The city's traffic flow is growing at an annual rate of 11 percent a year, says Waters. Thus, even though Georgia doubled metro Atlanta freeway capacity in the 1980s, rush hour congestion is still heavy. Adding more freeway capacity, however, is impractical. "We've used almost every available inch of [freeway] right of way," Waters says. "It would cost us billions to acquire more." In addition, metro Atlanta is a "non-attainment area" by federal air quality standards and, thus, is prohibited from adding more freeway lanes for single-occupancy cars. The ATMS project is really the only sensible option to improve traffic flow, and Water says it is expected to improve what he calls "vehicle throughput" by 10 to 20 percent.

The system's backbone is a fiber-optic cable network on 63 miles of interstate freeways and 100 miles of major arterial roads. Every device, including 453 monitoring cameras and the electronics to connect about 750 stoplights, will be tied into the fiber-optic network. The system's brain resides in an $18 million management center with a two-story operations room featuring a programmable video wall containing dozens of live TV images and computer displays. Systems—including those that provide traffic-signal management, emergency detection and response plans, graphic displays and alternate route suggestions—must operate together to provide consistent and reliable information. This requires real-time communication between the devices and the operations center.

The ATMS's distributed client/server architecture relies on a Sybase relational database management system that enables real-time data acquisition and control. A rule-based expert system developed with RTworks by Talarian Corp. provides strategies to respond instantly to accidents, breakdowns and other traffic snafus.

Although traffic operators monitor the system and have final decision-making authority, many of the accident detection and response processes are automated. Within two minutes, the system detects and helps operators confirm an accident, contacts police, fire and ambulance agencies as needed, and dispenses information to motorists "by just about any means that we can think of," says Waters, including highway radio and electronic signs, radio and television stations, computer bulletin boards and public information kiosks. The major responsibility of human operators is to supervise the system, approving, modifying or overriding its emergency-response plans. With such a leading-edge traffic-management system in operation, traffic jams will be less likely to dampen the Olympic fervor—or hinder Atlantans' commutes—next summer.

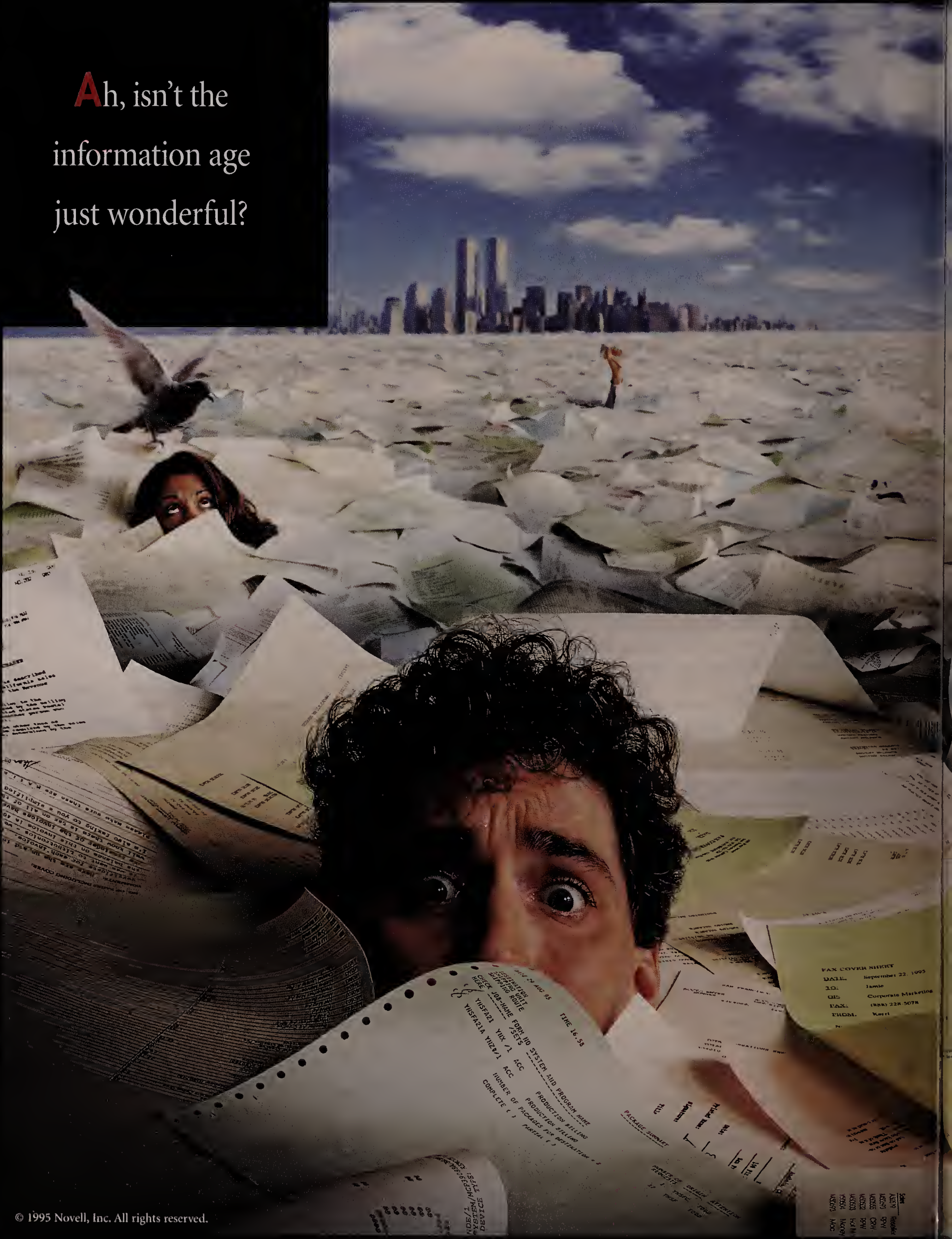
Traffic mitigation measures such as Los Angeles' Smart Corridor are projected to decrease congestion by 15 percent and reduce delay times due to accidents by 30 percent.

Smart Technology, Smoother Traffic

Los Angeles

In anticipation of the 1984 Summer Olympics, Los Angeles updated what was already a state-of-the-art traffic-management system featuring freeway on-ramp traffic signals. That system is now getting another upgrade—the way roads get a fresh coat of asphalt—in the form of the new $48 million

PHOTO BY LARA JO REGAN/SABA



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Santa Monica Freeway Smart Corridor project. Smart Corridor's coordination of the formerly separate state-maintained freeway ramp meters with the city's surface-road traffic lights is its primary benefit, says Hector Obeso, California Department of Transportation (Caltrans) senior transportation engineer and Smart Corridor project engineer.

In a city infamous for its traffic woes, the Smart Corridor encompasses five arterial roadways and a 13.6-mile stretch of the busiest freeway in the United States. The project

Smart Cars

Intelligent automobile technology exists today, but you won't be hitting the road in an automatic car anytime soon

There's an oft-told urban folk tale about a country bumpkin who purchases a van with cruise control. He thinks cruise control is like an airplane's autopilot, so as the vehicle speeds down the highway, he crawls into the back and stretches out for a nap with predictable consequences.

While most would laugh at this hapless driver, researchers are testing automatic driving gear that could make car autopilots at least technologically possible. When or if self-driving automobiles will ever become socially acceptable is another matter. Assuming that reluctance to turn over the steering wheel to a computer can be overcome, it will take about 100 years for truly collision-free automobiles to become commonplace, says Harry Mathews Jr., director of the manufacturing consulting practice and a longtime car technology analyst at Arthur D. Little in Cambridge, Mass. He expects new safety and guidance technologies to gradually work their way into the motor vehicle market during the next century, ultimately leading to collision-free cars.

Automakers have been testing collision-avoidance systems that use infrared, ultraviolet, radar and electronic braking, acceleration and steering technologies for several years. These technologies promise a number of safety advances, including automatic warnings to drivers when other cars are too close, skid control and even automatic braking when the driver ahead suddenly slams on the brakes. But the journey from pilot testing to mass production is a long one. After all, manufacturers were testing airbags 15 years ago and they've just recently become prevalent. Collision-avoidance technologies, which use much more complicated systems, will take longer to work their way into mass production, Mathews predicts.

To enable automatic driving, many subsystems have to be interconnected, centrally managed and linked to road traffic control systems. Such systems are technically possible today on a small scale but will take decades to become commonplace in the assembly process. The biggest technical challenge to automakers will be in manufacturing and testing, Mathews says. Automated highways and vehicles require reliable, durable systems that won't break down in inclement weather and extreme operating conditions. These demands require superb manufacturing quality control, careful testing and time-consuming applications engineering.

In order to build public acceptance of automatic highways, Mathews expects governments will take a gradual approach. For instance, a state may designate one high-speed lane on a stretch of highway for automatic vehicles. After drivers become accustomed to it, the system could be expanded to other lanes and other roads. Collision-free technologies and automated highways, which would eliminate stop-and-go traffic by moving vehicles along close together at high speeds, would relieve traffic congestion as well as improve car travel safety.

Governments could drive the adoption of automated vehicles by mandating standards as they have done in pollution control technology, Mathews says. Giving buyers of intelligent vehicles a break on their auto insurance would provide an incentive for consumers. Of course, adding new technology to cars raises the sticker price, so when or if the average consumer could afford an automatic car is uncertain even with some financial incentives. Nevertheless, the technology is on its way, Mathews believes. *–P. Fabris*

TODAY'S *electronic navigation systems are dashboard accessories. In the future, they will be just one of many smart technologies built right into the car.*

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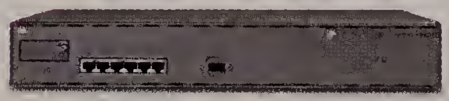

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GENE DONALDSON: *using a satellite system to reduce mass transit delays in Montgomery County, Md.*

aims to make it easier for drivers to bypass freeway traffic snarls by directing them to take alternate routes and to make traffic on those detours move faster by synchronizing freeway ramp meters and traffic lights on city streets. For the past decade, Caltrans traffic operators have regularly monitored freeway traffic levels and adjusted on-ramp green-light intervals to keep the right lanes of the freeways from clogging with merging traffic. Smart Corridor's integration of ramp meters with surface-street traffic lights and motorist information systems add more anti-traffic-jam weapons to the city's stockpile.

If a bus is behind schedule, a rule-based system that can automatically turn red lights to green will kick in, changing traffic lights as the bus approaches each intersection.

For example, let's say a truck containing frozen chickens overturns, blocking two lanes of freeway traffic. Magnetic detectors embedded in the road sense within 30 seconds when traffic has suddenly slowed and feed that information to the traffic operations center. Before taking any action, traffic operators must verify that there really is a problem on the road via closed-circuit TV camera feeds or eyewitness accounts. After a California Highway Patrol officer phones in the poultry predicament, operators estimate two lanes will be closed for three to four hours. They feed that and other data—such as expected traffic volume for the predicted clean-up period—into an expert system. The system suggests that intervals between green lights be lengthened from four to 15 seconds at the preceding five on-ramps; that electronic highway signs for that stretch of road flash the message: "Accident ahead. Use alternate routes. Tune to 1620 AM for more information."; that a road hazard advisory fax be sent to radio and TV stations; that electronic off-ramp signs tell drivers how to bypass the accident by taking city-controlled surface roads; and, finally, that traffic operators lengthen the green-light times on the surface route that bypasses the freeway accident. Operators must decide whether to accept, reject or modify this plan.

A Smart Corridor impact study completed several years ago predicted traffic mitigation measures such as these "will decrease congestion by 15 percent and reduce delay times [due to accidents] by 30 percent," Obeso says. With the project scheduled to go online by January 1996, Los Angeles drivers will soon have an opportunity to test those findings.

On-Time Transit

Montgomery County, Md.

Although Montgomery County, Md., won't be hosting the Olympics anytime soon, county officials there were similarly motivated to action by alarming projections that traffic volume in that Washington suburb will double by 2010.

As more cars compete for limited road space, county officials hope to entice more commuters to take advantage of public transportation with a system to help its buses stick more closely to their schedules and better inform riders of delays. It's the kind of project that officials hope will overcome commuters' reluctance to take mass transit.

Using the U.S. military's Global Positioning Satellite system, the county's 250 buses will have automated vehicle location systems onboard linked to the transit and traffic signal operations center in Rockville by the end of

PHOTO BY MATTHEW BORKOSKI

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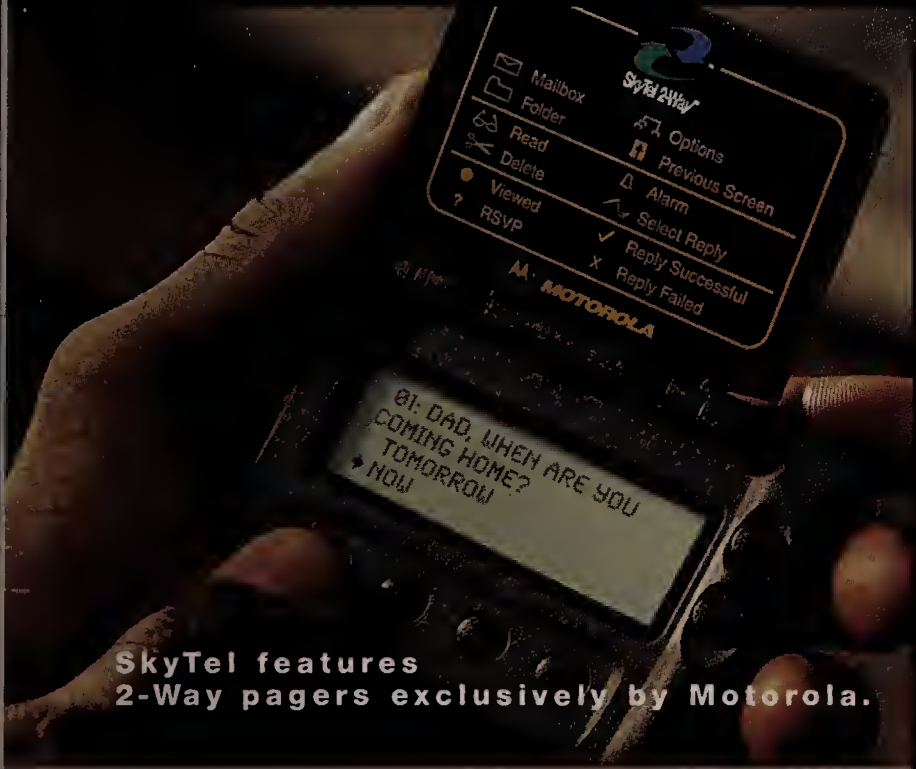

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Traffic Pit Stops on the Information Highway

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The Center for Transportation Research at the University of Texas
http://www.utexas.edu/ftp/depts/ctr/info_res.htm

California Department of Transportation (Caltrans)
http://www.dot.ca.gov/

Advanced Traffic Management Systems—City of Richardson, Texas
http://vette.cor.net/vette.htm

State of Washington Department of Transportation
http://www.wsdot.wa.gov/

Georgia Department of Transportation
http://www.dot.state.ga.us/

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1996. The system will track each bus on a geographic information system to within 10 feet of its actual location. If a bus is behind schedule, a rule-based system that can automatically turn red lights to green will kick in, changing traffic lights as the bus approaches each intersection to speed its journey. Transit officials stress, however, that the system will not wreak havoc with traffic flow just to get a bus back on schedule. It is programmed to take many factors—the number of people on the bus, traffic volume at each intersection, overall traffic flow along a road—into account when determining which signals to adjust for the benefit of buses. The idea is to synchronize the signaling system to move the most people (not necessarily the most vehicles) through the roadways as efficiently as possible.

The new transit system won't always speed up a bus enough to get it back on schedule, says Gene Donaldson, chief of the county's transportation management section, but he maintains that reducing a delay by even 15 percent is worthwhile. In addition to getting riders to their destinations faster, technology-augmented bus service will help transit managers dispatch and schedule the fleet more efficiently, says Marc Atz, service development and promotion section chief for the county's transit division. Saving a few minutes on each daily bus route will mean that fewer buses will be needed to serve the same number of riders, he says.

But while some 15 percent of Montgomery County commuters take buses now, county officials hope to encourage another 5 percent to use Montgomery County buses by not only improving on-time performance but also giving passengers realistic schedule information. To that end, they'll deploy real-time schedule displays similar to airport screens that show whether a flight is on-time or delayed at key bus stops and provide regular updates through a voice-activated phone system, cable television and the Internet. When bus passengers are sure of the time a bus is due to arrive, they are more likely to ride it, officials say.

Although the bus program is still in the pilot phase, Montgomery County's ATMS, which has been operating for 15 years, assists public safety departments in several ways. Traffic operators view real-time graphic map displays showing the status (red, yellow or green) of some 600 traffic lights throughout the county. "If a traffic signal [malfunctions], we know it within one second," Donaldson says. Traffic operators can immediately dispatch technicians to reset the light. As a result, drivers don't need to risk life and limb darting across free-for-all intersections, and police don't have to spend a lot of time directing traffic when lights malfunction.

On a recent September afternoon, operators in the county's traffic control center kept an eye on The Weather Channel to monitor approaching thunderstorms. Donaldson says lightning from a series of thunderstorms once knocked out 200 signals in one day. With early warning of approaching storms, public works personnel can prepare and respond quickly. In winter, strategically placed video cameras allow traffic operators to keep close tabs on road conditions and assist public works officials in prioritizing street plowing. Likewise, the traffic operations center, in constant contact with public works, can let people know when their streets will be cleared.

Although it is difficult to accurately quantify the payoff of ATMS in hard numbers, such ancillary benefits can boost public support for the technology. It is clear that a malfunctioning ATMS gets noticed by citizens quickly, Donaldson says. On the rare occasion when the system breaks down, "the phone rings off the hook." In fact, Donaldson uses such phone complaints to gauge the system's effectiveness. "When we started up the system, even though we had fewer roads and signals, we were receiving about 1,000 [complaint] calls a year," he says. "Now, we get about 200."

The bottom line is that ATMS technology now has broad-based political and public support in Montgomery County; indeed, it is almost taken for granted as an essential service. Observers expect many other urban areas to view the technology the same way within a decade. So there will be no need to wait for the Olympics to come to town in order for someone to do something about all that traffic.

Peter Fabris can be reached via e-mail at pfabris@cio.com.

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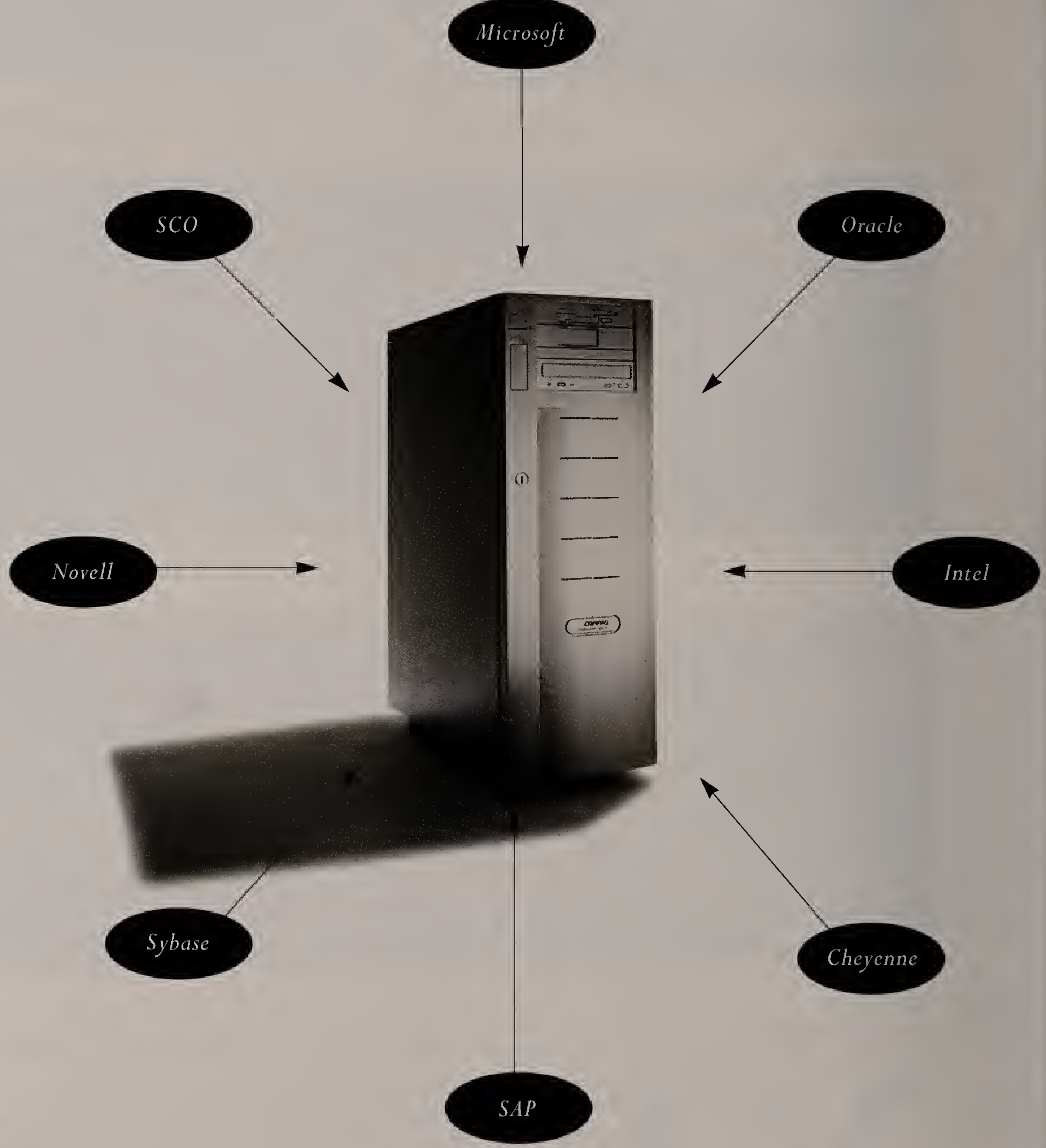

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Has It Changed Your Life Yet?

CIO Search and Rescue

The Coast Guard didn't use a CIO to rescue it from troubled IS waters. Now that it's in calmer seas, however, it's looking for a captain to chart a smoother course for the future.

BY RICHARD PASTORE

Too many CIO positions, it seems, are created as acts of desperation. Information management maladies infect an organization; then, like reeling victims dialing 911, the companies call in CIOs to rescue them from their systemic ailments.

But that isn't the case at the U.S. Coast Guard. The smallest of the armed services has diagnosed, triaged and begun resuscitation of its IS management without a CIO. In doing so, it hopes to pave the way for the CIO it expects to bring on board within the year.

The approach is somewhat unusual, according to observers. More typically, a CIO is hired to develop the turnaround plan and is required to take full ownership of it from the unenviable position of new kid on the block. Sometimes a consultant may make recommendations that include a strategic plan and provisions for its leadership. But the Coast

PHOTOS COURTESY OF THE UNITED STATES COAST GUARD

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U.S. COAST GUARD

Guard, in effect, has put the cart before the CIO, a strategy that makes perfect sense to Vice Admiral Kent H. Williams, the Coast Guard's chief of staff and chief operating officer equivalent. "If a CIO comes in and has to find all the problems, the immediate perception is it's him against everybody else in the organization," Williams says. Better to initiate the necessary changes first; that helps condition management to accept the need for change and then to accept the need for a CIO.

Such advance guard work could pay off in a smoother, more successful CIO introduction, agrees Gerald Loev, president of CSC I/T Management Consulting, a division of CSC Consulting Group in New York. "Bringing the new person in first can create all sorts of eddy currents in the organization—people wondering what this person's agenda is or if he has a secret mission," Loev says. And it may take more than a year for the newcomer to assimilate.

> “JUST CREATING THE POSITION IS NOT THE SOLUTION; IT'S FINDING OUT WHAT RESPONSIBILITIES TO VEST IN IT AND WHERE TO PLACE IT ORGANIZATIONALLY THAT MAKES THE BEST SENSE FOR THE AGENCY.”
>
> *–David McClure*

Of course, the Coast Guard's original motivation to start the change process wasn't to benefit some unknown future CIO. Before the organization could even consider hiring a guardian for its new IS strategy, it faced serious problems that demanded immediate attention. The grisly details were dredged up in a 1990 U.S. General Accounting Office (GAO) audit report that identified the following enterprisewide disorders:

- Lack of accurate and timely information needed to perform duties;
- Lack of top-level leadership and planning in information resources management (IRM);
- Absence of a strategic IRM plan; and
- Inadequate policies, standards and procedures for systems evaluation, development, implementation and review.

The Coast Guard is divided into areas that reflect its various missions such as law enforcement, marine safety and migrant interdiction. Each "program" is independently responsible and fiscally accountable. Because the agency has long enjoyed the close-to-the-customer advantages this structure provides, it was eager to preserve it. But, as with many private-sector organizations, the structure hampered cross-enterprise IS coordination. At the time of the audit, systems projects were not adequately defined, and there was much duplication and overlap across the Coast Guard's various independent program offices, recalls David McClure, GAO assistant director of information resources management policy and issues.

The GAO audit led to the temporary freezing of the Coast Guard's IRM budget. The Coast Guard might have fought the charges but chose instead to investigate, says Williams, who calls the year of the audit a "watershed" for the organization. Aided by the Volpe National Transportation Systems Center and Coopers & Lybrand Consulting, both of Cambridge, Mass., the Coast Guard began in 1991 to identify its IS performance gaps and drafted strategic IRM plans (known as SIRMP, but referred to with poetic license as "SHRIMP") for each of its independent program offices.

The consultants had originally suggested a more cross-functional analysis, rather than proceeding program by program. "We felt the right way to do it was from the top down. But, in hindsight, it never would have worked," says

KENT H. WILLIAMS: *Put the cart before the CIO.*

Eliot A. Madow, managing associate for the technology and finance group at Coopers. The independent culture of the organization's programs, its large size and its worldwide distribution would have made that tack impractical and potentially traumatic. "We knew they would have to reconcile the individual SHRIMP plans eventually, but you have to start where the client's organization is culturally," he says.

"PUTTING SOMEONE'S NAME ON A DOOR AND SAYING 'OK, NOW WE'VE SOLVED THE PROBLEM' IS FOOLISHNESS."

–Kent Williams

After spending two years spawning SHRIMP for a dozen programs, the Coast Guard came to grips with the need to tie the plans together and identify common needs via an umbrella strategic IRM plan, or "jumbo SHRIMP." That established enterprisewide procedures for allocating increasingly scarce resources. "We wanted to know where to put the next dollar to better leverage the Coast Guard as a whole," Williams explains.

Jumbo SHRIMP kicked off three major initiatives that helped lay the groundwork for introducing a CIO into the organization: moving from proprietary systems to an open client/server environment, creating an enterprisewide IT investment review board and designing the Coast Guard's first cross-functional database.

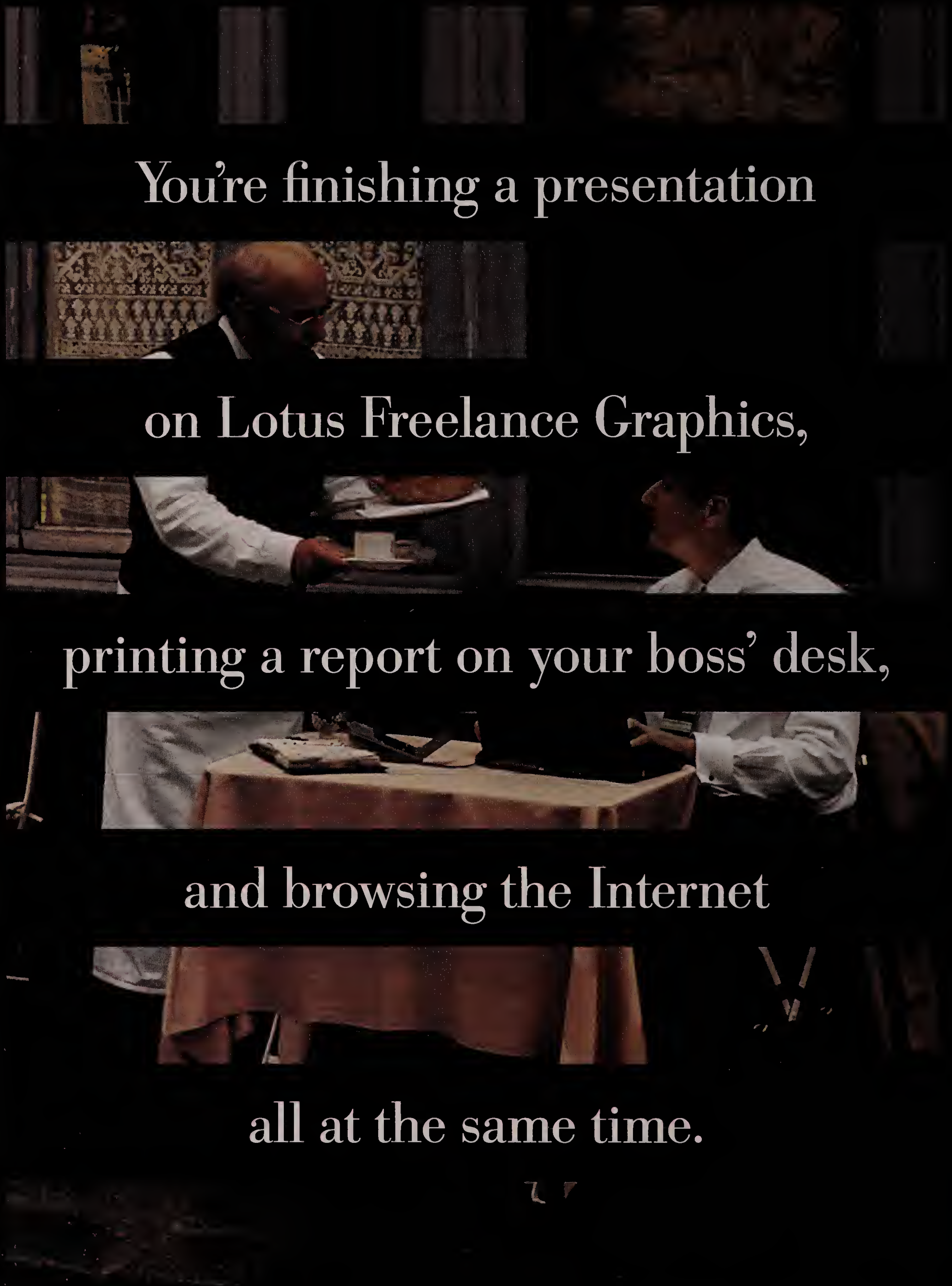
The migration plan is a multimillion-dollar, five-and-a-half-year switch from a CTOS-based distributed-computing environment to 20,000 Intel 486-based client/server workstations running Windows NT. Such a costly allocation cries out for a CIO to manage it at the highest levels of the organization, Williams asserts. It should not be "delegated down to folks working the technology on a daily basis," he explains. "They know the technology, but they don't know the organization's information needs."

The 3-year-old IRM investment review board, a peer group of senior program IRM managers, studies all proposed IRM investments and rates and ranks them. A second IRM board, composed of program managers, approves the first group's findings before passing them on to the designated senior IRM official for that project and eventually the chief of staff. Working on the boards has made managers familiar with the cross-functional review process, cultivating acceptance for what will become one of the CIO's main areas of oversight.

The cross-functional database is the type of system the CIO will be expected to initiate or promote. Dubbed "Management Information for Safety and Law Enforcement," it will record the history of ship boardings by officers from the marine safety and law enforcement programs. It will replace a stovepipe system that limits access to marine safety users only. Law enforcement officers currently have no way of knowing that ships in their harbors may have been boarded a week earlier by officers elsewhere, or what violations those officers may have found. And marine safety officials are equally in the dark about law enforcement boardings. This lack of coordinated information has aggravated the Coast Guard's increasingly limited capacity to board all ships in port at a given time. Knowing which ships to board and which to skip will be easier when the new system debuts within the next couple of years. The heart of the client/server system will be a relational database manager from Oracle Corp. running on a Hewlett-Packard Co. minicomputer host.

With these developments pointing the way, the Coast Guard began in early 1994 to map out its CIO charter, more than a year before the introduction of federal legislation proposing the appointment of federal agency CIOs (see related story, Page 64).

PHOTO BY KATHERINE LAMBERT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The Coast Guard CIO Duty Roster

1 Serve as CIO and represent the Coast Guard with other government and industry CIOs.

2 Drive, develop and maintain the IT strategic vision to support the organization's business vision.

3 Define business priorities and allocate IRM resources among competing projects.

4 Create a plan bridging current organizational and program requirements with the future vision and direction of IT.

5 Develop and promote long and midrange IRM planning that establishes clear linkages between the Coast Guard's strategic plan, its business processes, the IT strategic plan and IS initiatives and their budgets.

6 Develop and administer policy for management of records, forms, reports and other correspondence-related programs.

7 Develop and administer policy for the directives management program (printing, copying, distribution).

8 Implement IT standards, methods and policies across the organization to support Coast Guard programs.

9 Develop and implement IRM performance measures to support Coast Guard missions and goals, and incorporate those measures into the resource decision process.

10 Assess technical competencies required to make use of modern technologies, and ensure that employees' technical knowledge evolves with the state of the industry.

11 Develop, manage and administer IS security program.

The charter creates a post that is more than a paper tiger. "Putting someone's name on a door and saying, 'OK, now we've solved the problem' is foolishness," Williams says.

Unfortunately, public-sector organizations sometimes latch onto a private-sector concept like the CIO in the naive hope that it will instantly deliver them from evil. "It's easy to look at the commercial sector and say they do everything right, but the devil is in the details of implementation," says Rob Bowell, partner for IT in the government practice of Coopers & Lybrand LLP in Houston. On the flip side, there are also many public-sector managers who cast a skeptical eye on the notion that a CIO can make any waves.

Anticipating such attitudes, the GAO, an advocate of federal agency CIOs, insists that the position be more than a new box on the organizational chart. "Just creating the position is not the solution; it's finding out what responsibilities to vest in it and where to place it organizationally that makes the best sense for the agency," McClure says.

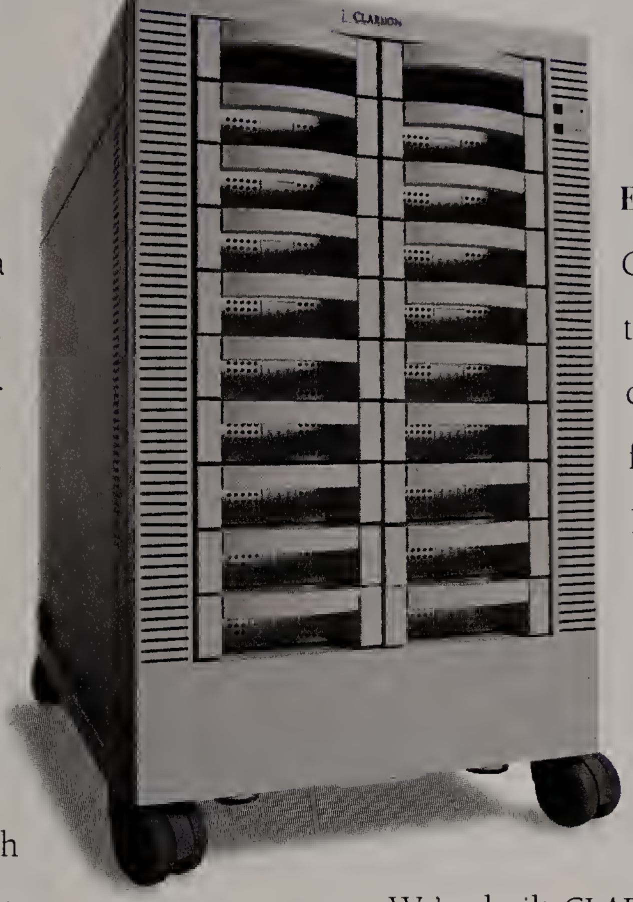
The new CIO's mission is straightforward: introduce and manage enterprisewide standards, oversee systems development and allocation to better leverage the strategic plan and, ultimately, comply with the national demand for "better government at less cost." IRM will be the position's sole area of responsibility. That's a major departure for a federal agency, since agencies often lump IRM with accounting, administration, payroll or other dubiously related duties of a "senior designated official." Overburdened, these officials will delegate IRM down to lower-level management, says McClure. That sacrifices the senior management visibility and interaction that is key to IRM success, he adds.

POSITION PATROL: *(From left)* **JEFF HIGH, DAVE POTTER, TERRY CROSS** *and* **DAVID BERNSTEIN** *drafted options for the CIO's reporting structure and responsibilities.*

PHOTO BY KATHERINE LAMBERT

The CIO's individual responsibilities were tougher considerations for the Coast Guard. An internal team studied the available CIO literature and consulted with the GAO, which had its own notions of IRM best practices (see related story, Page 62). But there was no one model that the Coast Guard felt comfortable copying. "This is one area where one size does not fit all," Williams notes. "You have to tailor these concepts to your own organization." For example, the Department of Defense, which has won praise for leveraging the CIO position, was too big to be very relevant.

In the end, the chief of staff favored taking the high road: The Coast Guard's CIO will focus more on IRM and business policy, vision and integration than on IT design and implementation. "We have engineering types working on the technology end. That's not what I want bogging down the CIO," says Williams, who holds an engineering degree along with master's degrees in management administra-



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tion and financial management. "When you own both the policy and the practice, the practice consumes all your time. You never get to the policy."

A list of specific duties is still being fleshed out, but the structure is there (see related story, Page 60). The chief is adamant that the role be well-defined before hiring someone to fill it. The alternative, finding someone and tailoring the job to fit that person, is wrong and shortsighted, he says.

As for the qualifications of a good candidate, Williams wants someone with a broad variety of experience, spanning IS management, business administration and familiarity with Coast Guard operations. "If you narrow it down too much, you might overlook capabilities that later you wish you hadn't," he says. "I want a really balanced person." He's also open to considering both military personnel and civilians.

But, ironically, the Coast Guard's advance solutions work may limit its pool of candidates. Some CIO types prefer to develop and take charge of their own plans and may not like the flavor of SHRIMP, jumbo or otherwise. The Coast Guard may see its applicants coming from a systems development/execution background,and many will be oriented toward execution and making things happen, Loev conjectures.

> "IF A CIO COMES IN AND HAS TO FIND ALL THE PROBLEMS, THE IMMEDIATE PERCEPTION IS IT'S HIM AGAINST EVERYBODY ELSE IN THE ORGANIZATION."
>
> *–Kent Williams*

The trickiest task (and the chief of staff's biggest ongoing concern) has been locating the CIO in the organization's reporting structure. The number-one priority is placing the position high enough to ensure visibility by the commandant and other top brass. One way to do that is to put the CIO on Williams' immediate staff, or vest the duties in the chief himself. But Williams is loath to embrace those day-to-day responsibilities. "My job is not to do but to review," he says. Instead, he wants the CIO to be a peer of the senior managers who run the Coast Guard's independent programs. Under a proposed restructuring plan, these officials will report to the chief of staff, which would assure the CIO's visibility and authority.

The success of this placement depends on passage of the Coast Guard's restructuring proposal. The organization is now studying a streamlining option that would consolidate today's 14 programs into four or five and reduce the number of officers that head them. If the proposal is scuttled, then the CIO would have to compete for attention with the current crowd of 14 program leaders,

Making the Grade

In May 1994, the U.S. General Accounting Office issued a report, "Improving Mission Performance Through Strategic Information Management and Technology," that has proven valuable to efforts to introduce CIO positions at federal agencies. In describing the "federal information management problem," the report noted that more than $200 billion has been spent on federal IT over the previous 12 years with little to show for it but frequently inaccurate, inaccessible or nonexistent information assets. These inadequacies have led to such boondoggles as the outlay of over $1 billion in mistaken Medicare payments, millions in unauthorized student loans and the accidental release of highly sensitive data on federal law enforcement informants.

The report was gleaned from studies of five private-sector IS management leaders and five state government standouts: American Airlines Inc., Eastman Kodak Co., the Royal Bank of Canada, USAA (United Services Automobile Association), Xerox Corp., and the states of California, Florida, Minnesota, Oregon and Texas. The report outlined possible solutions, including the 11 IS management best practices listed below.

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2 Get line management involved and create ownership.

3 Take action and maintain momentum.

4 Anchor strategic planning in customer needs and mission goals.

5 Measure the performance of key mission delivery processes.

6 Focus on process improvement in the context of an architecture.

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8 Integrate the planning, budgeting and evaluation processes.

9 Establish customer/ supplier relationships between line and information management professionals.

10 Position a CIO as a senior management partner.

11 Update the technological skills and knowledge of line and information management professionals.

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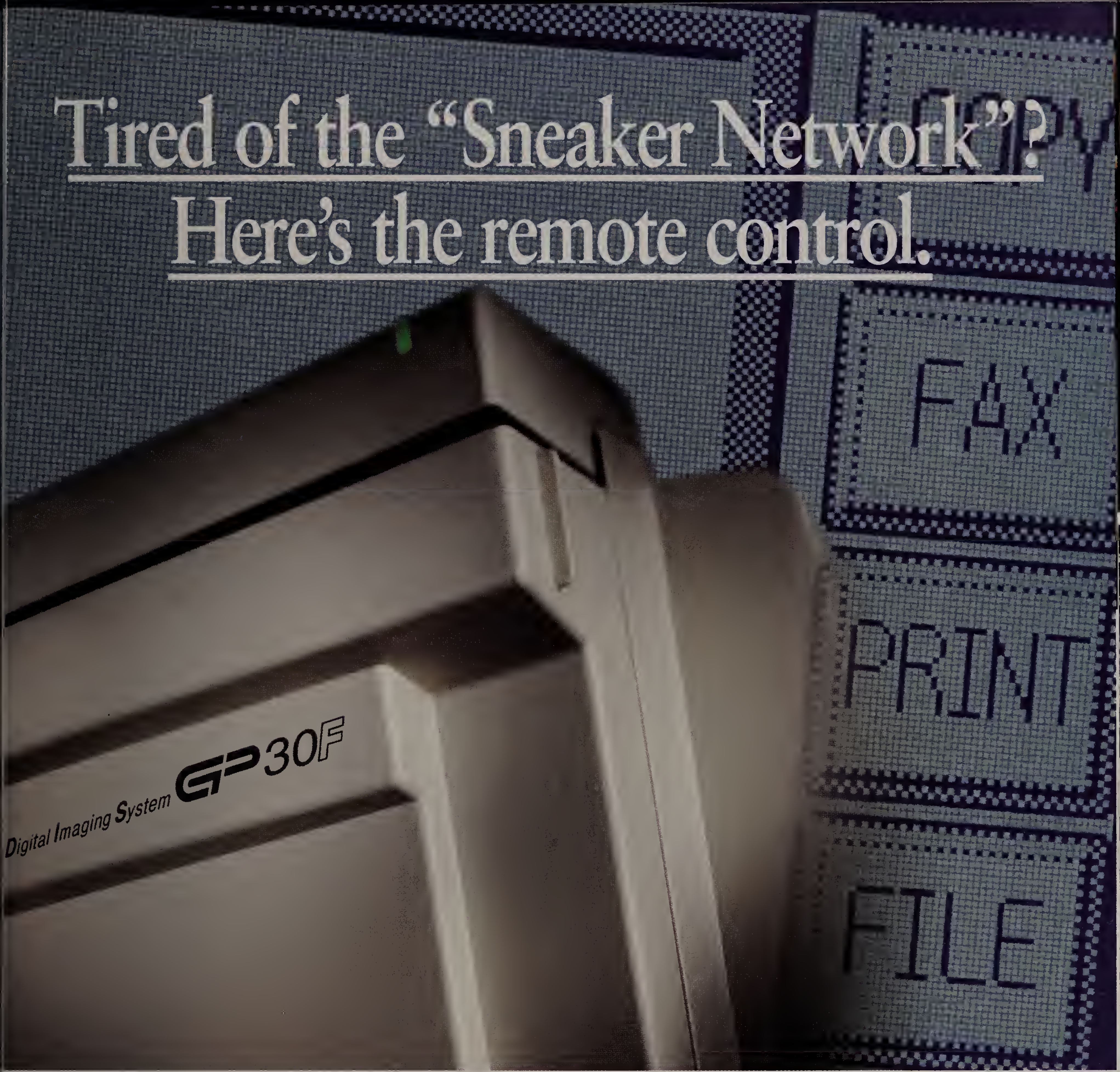

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CIOs March on Washington

Legislators argue about a national CIO position

Though a few federal agencies already have corporate-style CIOs, and others, like the Coast Guard, are creating such positions, the rest will have little choice but to follow suit if pending legislation becomes law. Passed by the Senate in August and awaiting reconciliation with a House bill at press time, the Cohen Amendment mandates the appointment of CIOs at all major federal agencies. But critics say the legislation doesn't go far enough to correct the government's inherent IS management flaws.

The legislation was originally introduced as a bill in June 1995 by Sen. William Cohen (R-Maine). It specified IT procurement reforms intended to save $175 billion through the year 2000 and cut the time it takes the government to buy IT from 49 months to 18. The bill also called for the appointment of agency CIOs as well as a national information officer to oversee the technological soundness of major projects and coordinate efforts across agencies.

Initially, the bill won endorsement from the government watchdog U.S. General Accounting Office (GAO), which has been pushing for federal CIOs and other reforms since 1994. Now, in its current form as an amendment to the Fiscal 1996 Defense Authorization bill (S.1026), the legislation comes up short, critics say. Their chief complaint is the elimination of the national CIO position, yanked from the amendment because of fears it would increase bureaucracy and provoke micromanagement.

The GAO also takes issue with that omission. "In any organization, there are opportunities to create shared benefits across the enterprise," says Christopher Hoenig, GAO director of information management policy and issues. "If you don't have a CIO at the enterprise level to identify and broker these opportunities, you have a very small chance of consolidating or reengineering processes and technologies."

Although the Office of Management and Budget (OMB) will continue to oversee IT acquisition, it won't fill the shoes of a national CIO. With the bulk of its attention focused on budget management, the OMB has little time for evaluating agency leverage of IT. "For the OMB director, that responsibility is ancillary at best," says Walter O'Neill, vice president of Federal Sources Inc., a private government market research and consulting firm in McLean, Va. "It's like giving a CIO's responsibility to the CEO of a giant corporation."

The legislation proposes an intra-agency council of CIOs to facilitate IRM best practice sharing. But critics question its effectiveness since it lacks funding authority. "If the council can't exert influence over the budgetary process at OMB, it will be little more than a source of good ideas that go nowhere," O'Neill predicts.

Paul A. Strassmann, adjunct professor of the U.S. Military Academy at West Point and former Defense Department CIO, testified before Congress that the legislation focuses on procurement reform to the exclusion of other key issues such as sharing intellectual assets and information security. He also feels the duties and powers of the CIOs are not well articulated. "It's a problem of inadequately defined governance," he says. "It's very easy to appoint a CIO, but if there is no due process, separation of power or what I call the information constitution, then you're sending that individual on a suicide mission." (See *CIO,* "Trendlines," Feb. 15, 1995, for a review of Strassmann's book, *The Politics of Information Management.*)

Despite its shortcomings, the Cohen Amendment is surely a significant step in the right direction. It would replace the Brooks Act, a 30-year-old set of hopelessly outdated and inefficient rules governing IT procurement. And it pushes the concept of the CIO in the face of every agency director and legislator in Washington. The shortcomings can be addressed later, Strassmann concedes. "There is only so much you can load on one piece of legislation before it capsizes." So keep your eyes peeled for that eventual "National CIO Wanted" job posting.

To read the full text of the Cohen Amendment on the Internet, access the 104th Congress Senate bill S.1026, amendment 2118, on the Web at *http://thomas.loc.gov/.* *-R.Pastore*

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putting visibility in doubt. In that case, Williams might look for a higher niche for the CIO to occupy. (Congress will review the restructuring plan next fall as part of the Coast Guard's 1997 budget proposal.) Regardless of the proposal's outcome, the Coast Guard expects to have its CIO within a year.

Though still a work in progress, the Coast Guard's IRM ministrations have gone far beyond what was needed to unfreeze its IT budget. In recent reports, the GAO found favor with the Coast Guard's IT investment review process and credited the organization for use of decision-making criteria severely lacking at most federal agencies.

Paul A. Strassmann, former CIO of the DOD (and a hard man to please), says he's delighted with what the Coast Guard is doing. "They certainly asked the right questions," says the adjunct professor of the U.S. Military Academy at West Point and president of New Canaan, Conn.-based consultancy Strassmann Inc. He adds that smaller federal agencies like the Coast Guard seem more capable of progress than the giant omnibus groups.

The chief of staff is clearly proud of his organization and excited about the CIO's prospects. "If we charter the position correctly, and I think we have, and if we hire the right person, it will take off," Williams says. "I think it's going to be a super job."

(For more information on the Coast Guard's missions and operations, see the agency's Web page at *http://www.webcom.com/~d13www* .)

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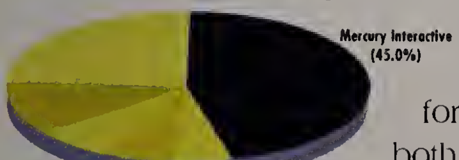

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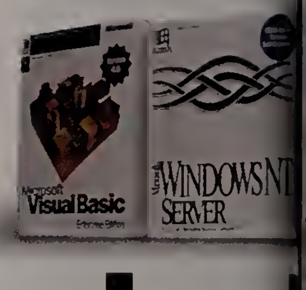

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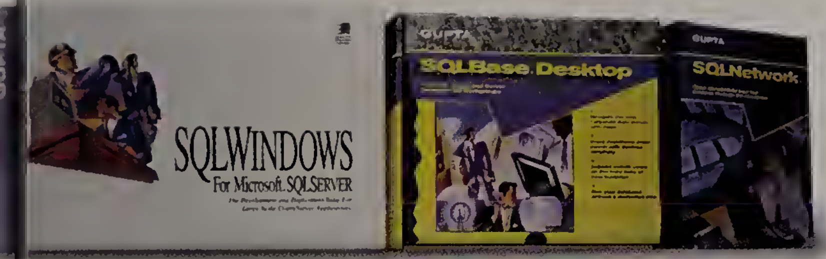

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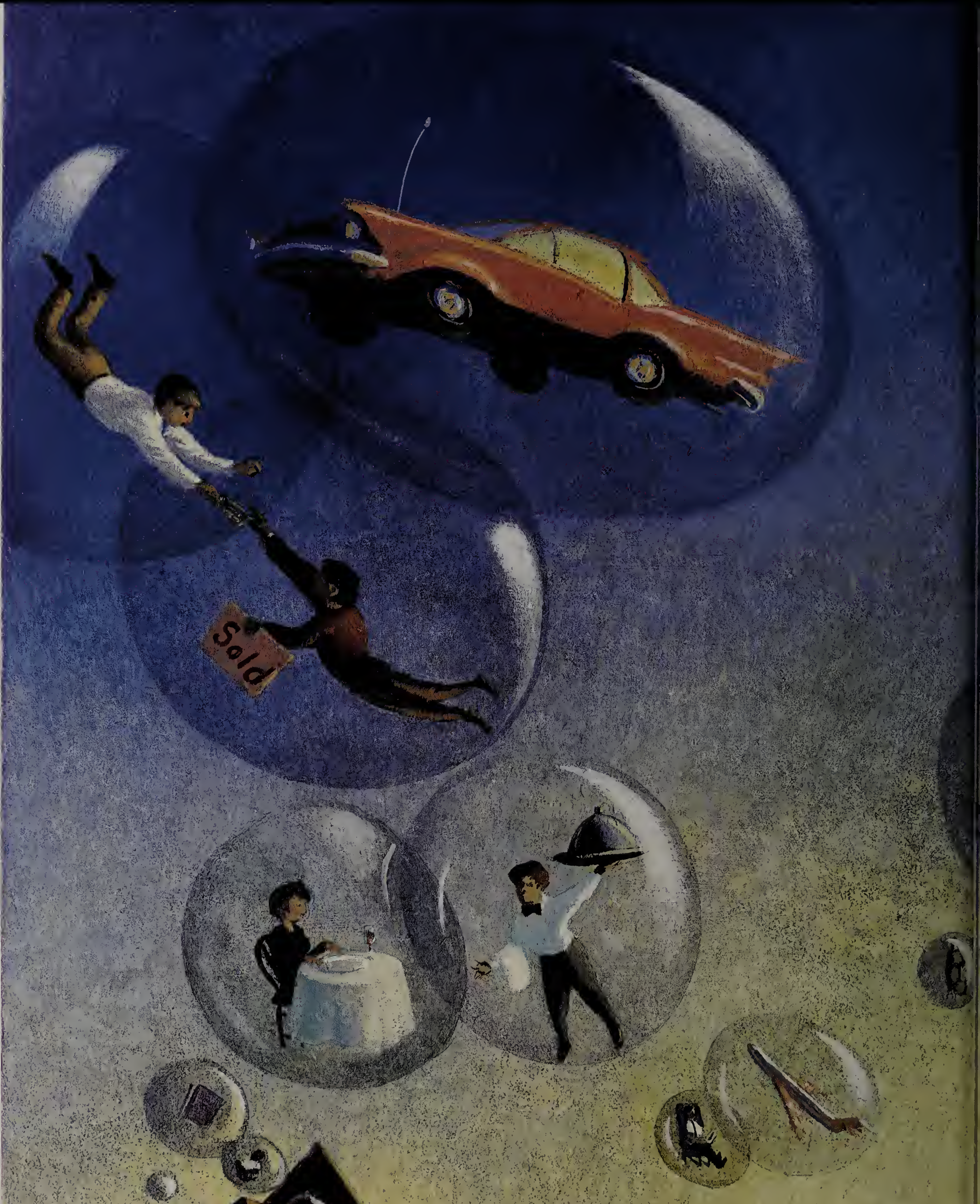
Sold

What would you call a marketplace that was created, defined, nurtured and exploited through the use of information technology? Some business theorists are calling it a market*space*.

MutaBle markets

BY CHRISTOPHER KOCH

The frequent flier mile may be the information age's only true native-born currency. The yen and the dollar flow in virtual torrents through the world's computer systems, but legal tender is inherently physical; even as we approach the so-called cashless society, banks and governments continue to hoard piles of the stuff to prevent economic anarchy. Despite our best efforts, money can't be bits and bytes, it can only be shepherded around by them.

Frequent flier miles, meanwhile, are wholly born of, and defined by, information. They start out digital—they spring from a computerized ticketing transaction tied to a name in a computer database; and they remain digital—we never actually see or hold them. Yet we treat them like currency. We trade them across other computerized markets in exchange for

ILLUSTRATION BY KEVIN HAWKES

such things as phone service and credit-card purchases. We're even willing to steal them, and governments are willing to punish us for doing so—perhaps the ultimate test of value today.

What is this currency that has no physical basis traded in markets that have no physical form? John J. Sviokla and Jeffrey F. Rayport, professors at Harvard Business School, call it a phenomenon of the "marketspace."

A buzzword perhaps, but an evocative one. Marketspace describes the transition from physically defined markets to markets based in and controlled by information. In this transition, information does not merely add efficiency to the transaction; it adds value. For IS, it can mean a shift from the siege mentality of cost reduction to the creativity of revenue generation.

"We're seeing a transition from the place to the space," says Sviokla. "We're seeing products, whether they're newspapers, compact discs or videocassettes turning into intangibles—pure information feeds over America Online or video on demand. Products are becoming services; tangibles are becoming intangibles." The trend is also occurring in management systems, with the move away from face-to-face meetings and toward voice mail, electronic mail and teleconferencing.

But perhaps the most powerful "place-to-space" transition is occurring in markets. Information spaces provide a cheap, efficient, customizable backdrop to create new ways of doing business, without the logistical baggage and barriers to entry that impede the creation of physical markets. Sviokla has a rule of thumb for knowing when you're in a marketspace: "If you can't tell exactly where the transaction occurred, it happened in the marketspace."

The frequent flier mile comes from the same industry that gave us one of the best known and oldest marketspaces: the computer reservation systems (CRSs) originally developed by major U.S. airlines in the 1950s and '60s to support the exploding volume of ticket traffic. Ironically, this marketspace emerged almost by accident. In 1975, an effort to create an industrywide CRS collapsed, and the major airlines—led by American and United—began aggressively marketing their internally developed systems to travel agents. Although competitors had some access, each airline used its system to push its own flights until 1984, when the Department of Transportation ruled that all CRSs had to offer equal access to competitors.

"The challenge of the future for most businesses is going to be to manage your marketplace and your marketspace."

–Jeffrey Rayport

When the CRSs opened up, they thrived as independent marketspaces. "At that point, the CRS stopped being a distribution arm of the airline and really became a business in its own right," says Michael J. Durham, president and CEO of The Sabre Group, the information technology unit of American Airlines' parent company, AMR Corp. (Sabre Group developed the industry's largest CRS—which also happens to be the largest nongovernmental real-time computer system in existence.) "People realized, 'Gee, this is a valuable service that I can provide to a whole range of travel industry partners,'" says Durham. "'I can and should charge for it. And, in fact, it's a good value to the travel associates that distribute their product over our network because it would cost them much more to replicate that work themselves.'"

The usage fees charged by Sabre and by United's Apollo system, among others, have caused controversy and outright rebellion at times from smaller rival airlines, but commerce flowed into these marketspaces nonetheless. Hotels, car-rental agencies, Broadway theaters, even florists use the virtual spaces to reach travel agents. And the marketspace itself is marketable. For example, Sabre's Decision Technologies division now consults with outside industries—most recently insurance and financial services—to create decision-support systems. It also contracts with other airlines to run reservation systems and frequent flier programs.

In 1959, when American created Sabre, it could not have predicted that the information it gathered *about* flights and customers—and the way it gathered that information—would be more valuable than the flights themselves. The Sabre Group generated $1.5 billion in revenue in 1994, employs 8,000 people and is consistently profitable ($367 million in 1994). Meanwhile, the airline itself—though recently profitable after protracted bleeding—is continuing to have difficulties, especially in short-haul markets where smaller competitors like Southwest are winning the battle to accommodate the inherent inefficiencies of moving people, rather than information, around the globe. "[American] has put a lot of money into planes and facilities," says Woodrow Chamberlain, a vice president with CSC Consulting and Systems Integration. "They're moving out of the niches where short-haul carriers are eating them up on cost."

There is a good reason why Sabre consistently outperforms the airline it was built to serve. As markets move from place to space, costs are not only reduced, but there are also greater opportunities to isolate pieces of the value chain and capitalize on them individually. Sviokla and Rayport divide the value chain into three basic pieces: content (the product or service), context (the way the product or service is offered) and infrastructure (the underlying systems that support the process).

In the marketplace, these three pieces tend to be aggregated, as in the airline industry, where larger airlines still carry the burden of owning most of what they use to serve customers. It's also true in publishing, where subscribers and advertisers pay not only for the information printed in the publication (the content) but for the publication's style and layout (the context) and the printing process and delivery systems (the infrastructure).

In the market*space*, however, the picture changes. An online service such as America Online, for example, deals only in context, providing a user-friendly lens through which to view content from other sources, such as newspapers, magazines and the Internet. The infrastructure, meanwhile, consists of a motley assortment of assets such as phone lines, computer networks and home PCs owned by a variety of entities, including the consumer.

From all this slicing and dicing of the value chain, vibrant new markets can emerge—markets that could not exist in the physical realm. Consider Florida State University, which has transformed the humble plastic student ID card into a virtual talisman of the marketspace.

> **"If you can't tell exactly where the transaction occurred, it happened in the marketspace."**
> *–John Sviokla*

In the fall of 1988, FSU's Bill Norwood, then director of information systems development, surveyed the annual chaos of class registration and financial-aid disbursement on campus and wondered whether everyone had simply grown accustomed to long lines and duplicative paperwork. "We began looking at the 'what ifs' and realized that if we could make the student ID like a bank card, we could tap into big administrative cost savings and revenue-generation opportunities," says Norwood.

Partnering with a local bank, Norwood (now executive director of FSU's Card Application Technology Center) created virtual bank accounts so that financial aid could be transferred directly to the students without pumping checks through the bursar's office, and tuition could be paid directly from those accounts. A network of ATM-like kiosks, built in partnership with MCI Telecommunications Corp., lets students do business quickly and easily while also providing a convenient medium through which to sign up for classes. "We took advantage of what people had to offer," says Norwood of his infrastructure partnerships. "We didn't try to duplicate anything."

In 1991, Norwood added MCI's long-distance calling service, voice messaging and voice mailboxes to student accounts so they could receive immediate notification of their financial disbursement rather than waiting for a letter—and so that they could send digital notes to one another. Norwood estimates that the system saves the school $300,000 a year in administrative costs alone.

Yet an ID card powerful enough to scuttle the lines in the registrar's and bursar's offices has limited value if students can't use it to do more important things, like buy a pepperoni pizza downtown at 2 a.m. To use Sviokla and Rayport's terminology, Norwood needed to put more strength into the ID card's "content."

"It obviously had to be a very open system," Norwood says. "It couldn't be limited to just the campus. If we put $5,000 in your student aid account and the only place you could spend it was at the bookstore or the laundromat, you would shortly get very tired of that."

Norwood realized that the student body

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represented a very powerful and very loyal (they probably weren't going anywhere for four years or so) marketing tool. "We had to realize that we had what the financial world refers to as a cardholder base. If I go to a merchant and say this card represents 30,000 members, that has value. I further extend that value when I say that in 1995, this card is going to have $30 million in financial aid attached to it. Now they're really interested."

Norwood and FSU marketed the card to local merchants (bars, liquor stores and other potential danger points excluded), while resisting the temptation to join the ubiquitous MasterCard and Visa systems. "This card is as near to Visa and MasterCard as we can get without actually putting the logo on," he says. "If we do that, we become just like a bank to a merchant." Some local merchants resisted the idea of setting up new card readers in their stores to accommodate FSU, but no one could argue with the power of 30,000 students armed with prepaid accounts. Merchants get increased sales from students who don't need to carry cash, while Norwood and FSU benefit by taking a small percentage of each sale from participating merchants.

Norwood has created a private, carefully controlled marketspace while continuing to add value for his customer base, the students. Some have protested the increased control FSU administration has over their finances and their lives—ID card readers in the dormitory doors record students' individual comings and goings, for example—but access to that data is protected by law, according to Norwood, just like the data collected by credit cards. Small comfort, perhaps, but the system has nonetheless proven irresistible to students.

Norwood is hoping to keep that sense of irresistibility alive among students even after they graduate. Students can keep their voice mailboxes to stay in touch with dispersed friends and access FSU's career services. They can also continue to use the debit and calling card features of the ID card, perhaps eventually having the option to convert the card to a standard MasterCard or Visa. Norwood notes too that the network is a rough foundation for potential online education services, and he allows that FSU's intensely detailed student information will have great value in future alumni fundraising efforts. Meanwhile, Norwood has built a new division at FSU—the Card Application Technology Center—that helps other universities and public institutions to create their own marketspaces. So far, more than 250 universities have followed FSU's lead.

"Ask somebody what they love about their Visa card and they're not going to say the transaction-processing capability."

–Jeffrey Rayport

For those schools that haven't yet ditched the coin slots on the dormitory washing machines, there's good news: Creating a marketspace like FSU's will not require nearly as much creativity or resources in the very near future, according to Sviokla and Rayport. "The World Wide Web has driven a global networking standard," says Rayport. "We now have the infrastructure in place to have a robust information world into which businesses can go to establish relationships with customers."

Ironically, some of the most sophisticated Web-based marketspaces are being developed in countries that have until now lacked the resources to develop a modern communications infrastructure. In China, the China Internet Company is building a network among 40 different Chinese cities that will use the Web as a network to exchange product information, pricing, e-mail, relevant import/export regulations and an online translation service, according to Sviokla. "They'll use it as their primary document engine because they don't have a document industry right now," he notes.

As FSU and the Chinese network demonstrate, the customer is stepping into the information space. CIOs will have more responsibility for dealing with that customer and leveraging that relationship to create new value. "The space will become dominant in relationship management because, in many cases, once you plug into an established network like the Web, the cost of serving that incremental customer may be close to zero," says Rayport.

Although most companies still assume that the best way to communicate with customers is with a printed billing statement, growing numbers of customers may soon be willing to part with the paper. "As a CIO, I need to ask myself, do my customers prefer the place or the space?" asks Rayport. "And if it's the space, I should be prepared to meet them wherever they want, whether it's the Microsoft Network, the Web or a telephone with voice response."

If the CIO sticks to systems management, he or she will lose control of the emerging re-

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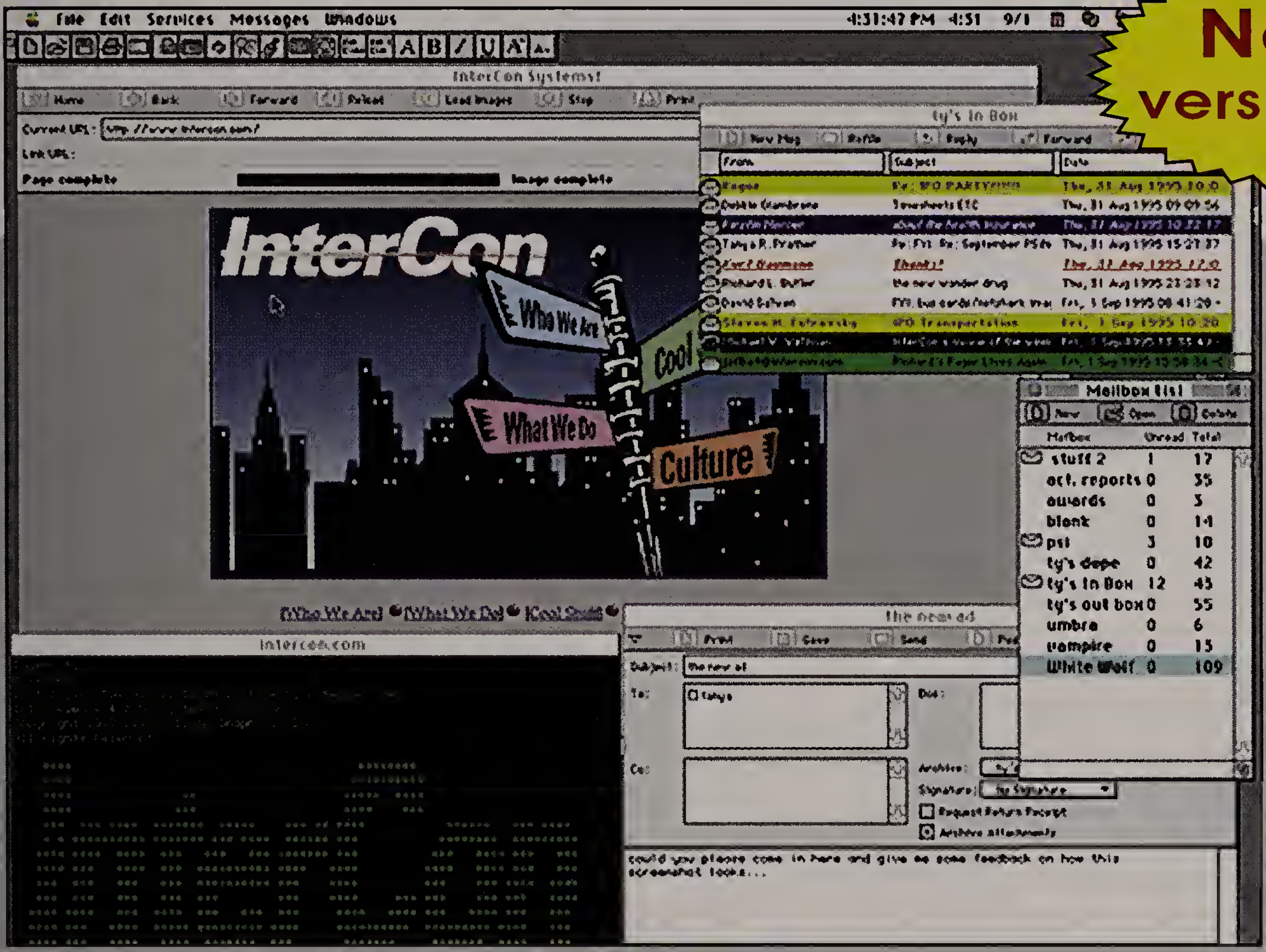

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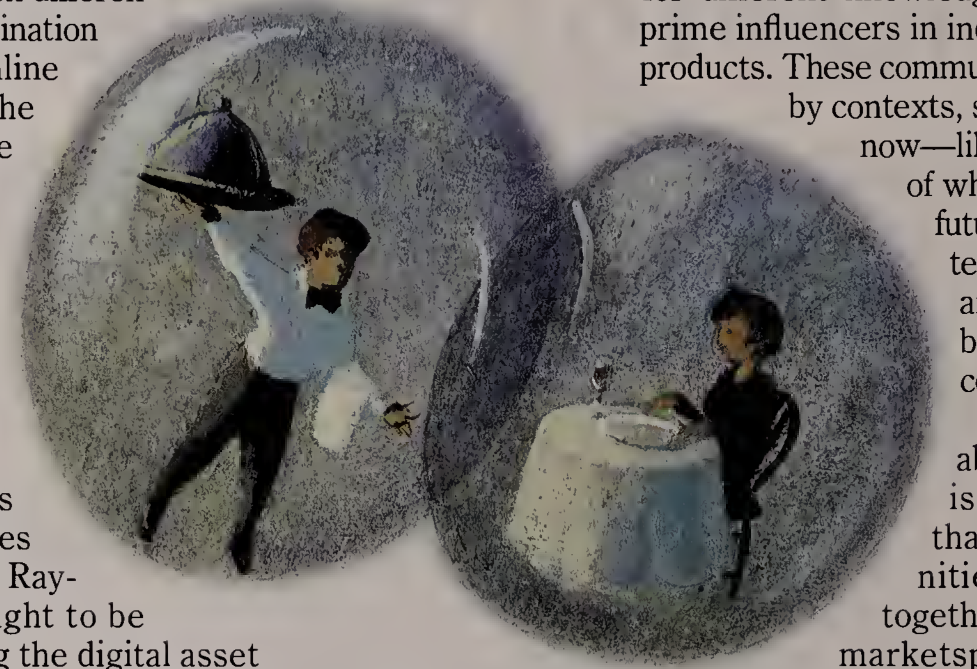
lationship with the customer, Sviokla argues. “The real customer interaction, when you look at it from an information differentiation standpoint, is a combination of what happens on the online system, the fax terminal, the mail correspondence and the phone service. If the systems guy only has responsibility for what's on the box, he's dead meat. The demands on the systems side come directly from the problems in communicating with customers.”



“Traditionally, these guys have thought about the pipes that ship the information,” Rayport adds. “What they ought to be thinking about is managing the digital asset represented by the information content itself and then buying or leasing access to any pipes that are required to deliver high-quality access to customers.”

Nowhere is this more evident than in what may be one of today's only mature marketspaces: the credit-card industry. With credit cards, the core transaction and data processing (infrastructure) have become irrelevant, as has the credit piece, which varies little. What matters is the extra content, the package of services that customers receive with the card—such as free gas, more frequent flier miles or an integrated telephone calling card. Once consumers become loyal to the context, whether it be Citicorp or American Express, the possibilities for new value—and new strategic partnerships to create that value at a low cost—are endless. As proof, consider the marriage between Citicorp and American Airlines that yielded one of the most successful credit cards in history.

“Ask somebody what they love about their Visa card and they're not going to say the transaction-processing capability,” says Rayport. “They're going to talk about a bunch of things that IT managers generally think of as soft and fuzzy and not their job. But it's absolutely their job because part of the way you deploy technology effectively is understanding how customers want to be served.”

Increasingly, that service will be offered in marketspaces that look and feel like communities. “Right now, if you're a CIO, you have a responsibility to know that the next killer app is in the emerging electronic marketspaces, and it's the creation of communities,” says Sviokla. “There will soon be a community of interest for different knowledge bases that will be prime influencers in industrial and consumer products. These communities will be facilitated by contexts, some of which we have now—like the Web—and some of which will emerge in the future. Some of these contexts will be proprietary and some will be public, but they will all serve communities.”

“If you're going to make a market in the space, the first thing you have to do is get users with common interests together. The transactions will follow.”

–Jeffrey Rayport

In an era when just about the only scarcity is demand, companies that help these communities of customers get together to talk will rule the marketspaces, according to Sviokla and Rayport. “If you're in the paint business and you're not facilitating the knowledge domain on the Web for paint engineers, then someone else will,” says Sviokla. “The facilitator of that virtual community will be the market maker in the space,” adds Rayport. “It's as simple as that. A market is a community and a community is a market. And if you're going to make a market in the space, the first thing you have to do is get users with common interests together. Then the transactions will follow.”

Yet facilitating a market does not translate necessarily into trying to control it, both say. As networks expand and proliferate, any attempts at complete control in the wide open marketspaces of the future will ultimately fail. “Bill Gates isn't thinking about control with the Microsoft Network; he's talking about creating a proprietary network with lots of hooks into open systems,” says Sviokla. “I think that's a very different way to think about customers.

Get Spaced

Sviokla and Rayport expound further on the potential of the marketspace in “Exploiting the Virtual Value Chain,” in the November/December 1995 issue of the *Harvard Business Review.*

“Businesspeople still think in terms of what they should own or control,” he adds. “I'd like to invite them into a different language that asks, ‘What are we going to influence and what are we going to participate in?’ ”

Christopher Koch can be reached via e-mail at ckoch@cio.com.

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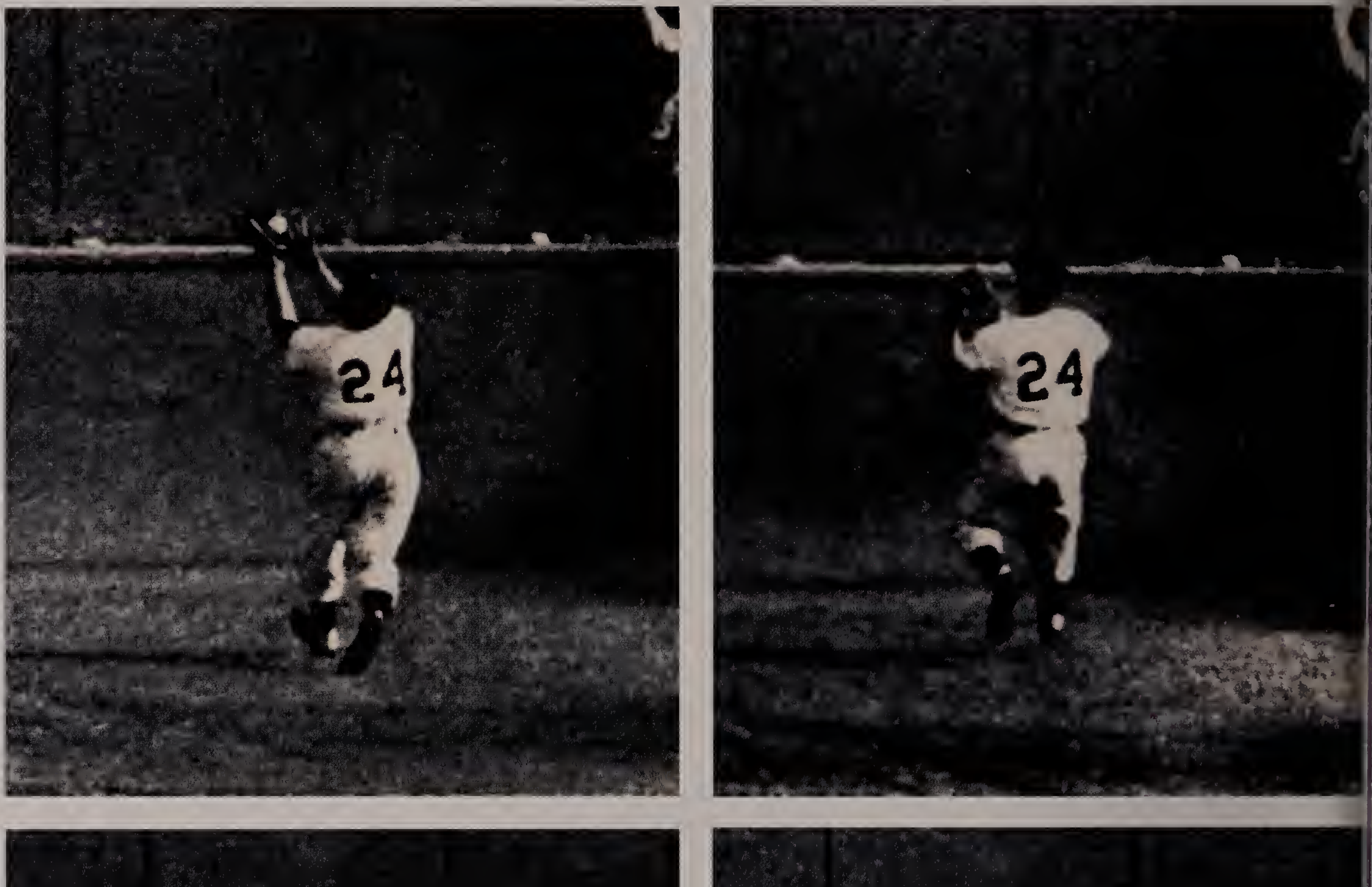
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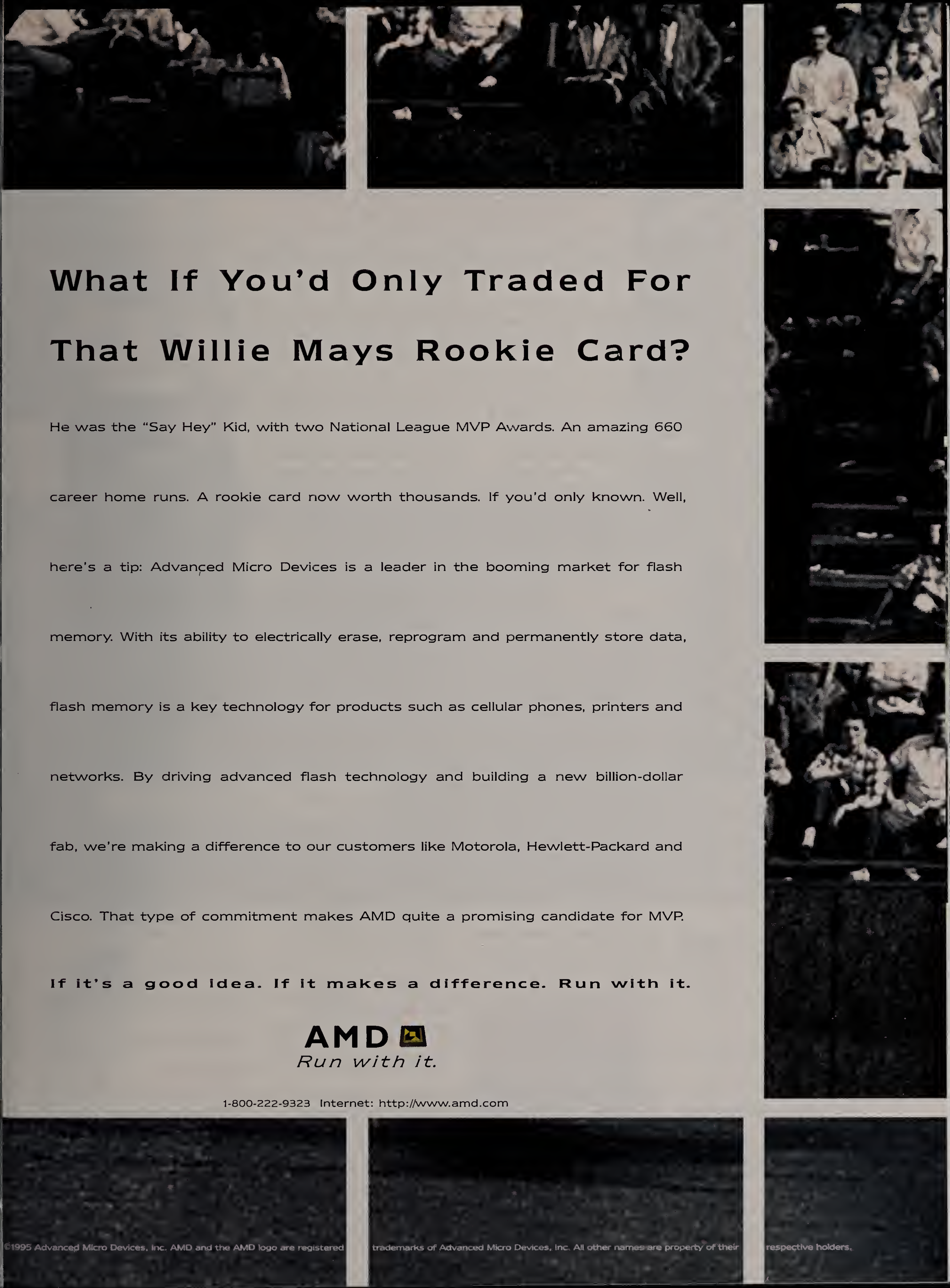

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The Year in Review

An index of all major articles published in *CIO* in 1995, including a cross-reference by article type

Articles are numbered in sequence from the first issue of CIO. *(See past December issues for guides to stories published prior to January 1995.) To help readers find articles of interest, we've added a cross-reference of categories at the end of the listing. For example, readers interested in online strategies would look up 932 and 954. An online index of articles, dating back to January 1993, is available on the World Wide Web at* http.//www.cio.com/ciomaghome.html.

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897. "Between a Rock and a Hard Place" *(Page 26)—reducing costs while maintaining quality is a challenge for most IS executives. A Second Opinions feature about Digital Equipment's challenge by Carol Hildebrand*

898. "Corporate Healers" *(Page 36)—organizations that have been through downsizing and reengineering, such as Unisys, Northeastern University and Rhode Island Hospital, must pay attention to healing the wounds of layoff survivors. By E.B. Baatz*

899. "Cultivating an Information Culture" *(Page 46)—Tom Davenport talks about managing the information culture for competitive advantage. An interview by Leigh Buchanan*

900. "The Year in Review" *(Page 52)—an index of all major articles published in* CIO *in 1994, including a cross-reference by article type.*

901. "Adventures in Serviceland" *(Page 22)—client-centered by nature, professional-services firms practice what the reengineering gurus preach. An Insights column by James V. McGee*

902. "Information Imperative" *(Page 58)—IS executives ignore the information component of IT at their peril. A Reporter's Notebook column by Anne Stuart*

903. "No Place Like Home" *(Page 64)—remote technology is helping keep federal workers off the road and close to home. A Working Smart column about the U.S. government and Charles County Community College's InTeleWorkNet telecommuting center by Tracy Mayor*

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Special Issue: The ESPRIT Awards

904. "Harvest Season" *(Page 26)—an introduction to the 1994 Esprit Awards and honorees.*

905. "Garage Sales" *(Page 30)—integration of back-office functions has brought improved customer service and savings to APCOA Inc., a parking-facility management firm. By Carol Hildebrand*

906. "Making Them Pay" *(Page 36)—an automatic billing and accounts receivable system has brought in a previously uncollected $120 million to Massachusetts. By Richard Pastore*

907. "The Soul of a New Machine Seller" *(Page 42)—computer distributor PCs Compleat built itself around an enterprisewide information system, distinguishing it from its competitors and ensuring its success. By E.B. Baatz*

908. "Satisfying the Inn Crowd" *(Page 46)—a sophisticated central reservation system gave Hyatt Hotels new staying power. By Anne Stuart*

909. "On the Road Again" *(Page 50)—Caterpillar's Engine Division preserved its good name by giving service shops easy access to its mainframe. By Deidre Sullivan*

910. "A Seasoned Performer" *(Page 56)—Kmart's bid to recoup its fortunes includes a system that overhauls management of seasonal merchandise. By Megan Santosus*

911. "CIO's 1994 Readers' Choice Awards" *(Page 61)—our research group surveyed readers and came up with a list of leading technology vendors and products in five software and hardware categories.*

912. "Doing More With Lease" *(Page 20)—companies deciding to lease computer equipment must make sure they're getting the best deal. An Insights column by John E. Callies*

913. "The Name Game" *(Page 76)—is information technology making progress or do we just repackage it periodically? A CIO Confidential column by W.F. Dyle*

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914. "Playing to Win" *(Page 26)—CIOs and negotiators suggest strategies for getting the greatest possible value out of vendor contracts. By Mickey Williamson*

915. "Beneath the Big Dig" *(Page 34)—Boston's Central Artery Project has introduced radical techniques and a powerful information environment to American civil engineering. By Fred Hapgood*

916. "Franchise Players" *(Page 44)—franchise operators discuss how IT can be used to deliver top-notch customer operational practices among small, scattered outlets. By Mickey Williamson*

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Tunnel Vision
How Boston's Big Dig Stays Out Of A Rut
Driving A Hard Bargain With Your IT Vendors

917. "Getting the Home Fires Burning" *(Page 52)—as telecommuting becomes more compelling, CIOs must determine their role in ensuring their companies' success. By Tracy Mayor*

918. "Tiger Teams" *(Page 22)—technology is often blamed for the failure of client/server projects usually caused by insufficiently trained people. A First Person column by Larry Runge*

919. "A Landmark System" *(Page 64)—Norfolk Southern's ability to sell and lease land was greatly improved by an IT-based reengineering of its archaic processes instituted by Systems Techniques. A Working Smart column by Peter Fabris*

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Special Issue: Achieving Software Quality

920. "Beating the Bushes" *(Page 32)—there is no single solution to the problem of finding expert client/server programming help. By John P. Mello Jr.*

921. "Out-of-this-World Software" *(Page 40)—the space shuttle's onboard-systems team at Loral*

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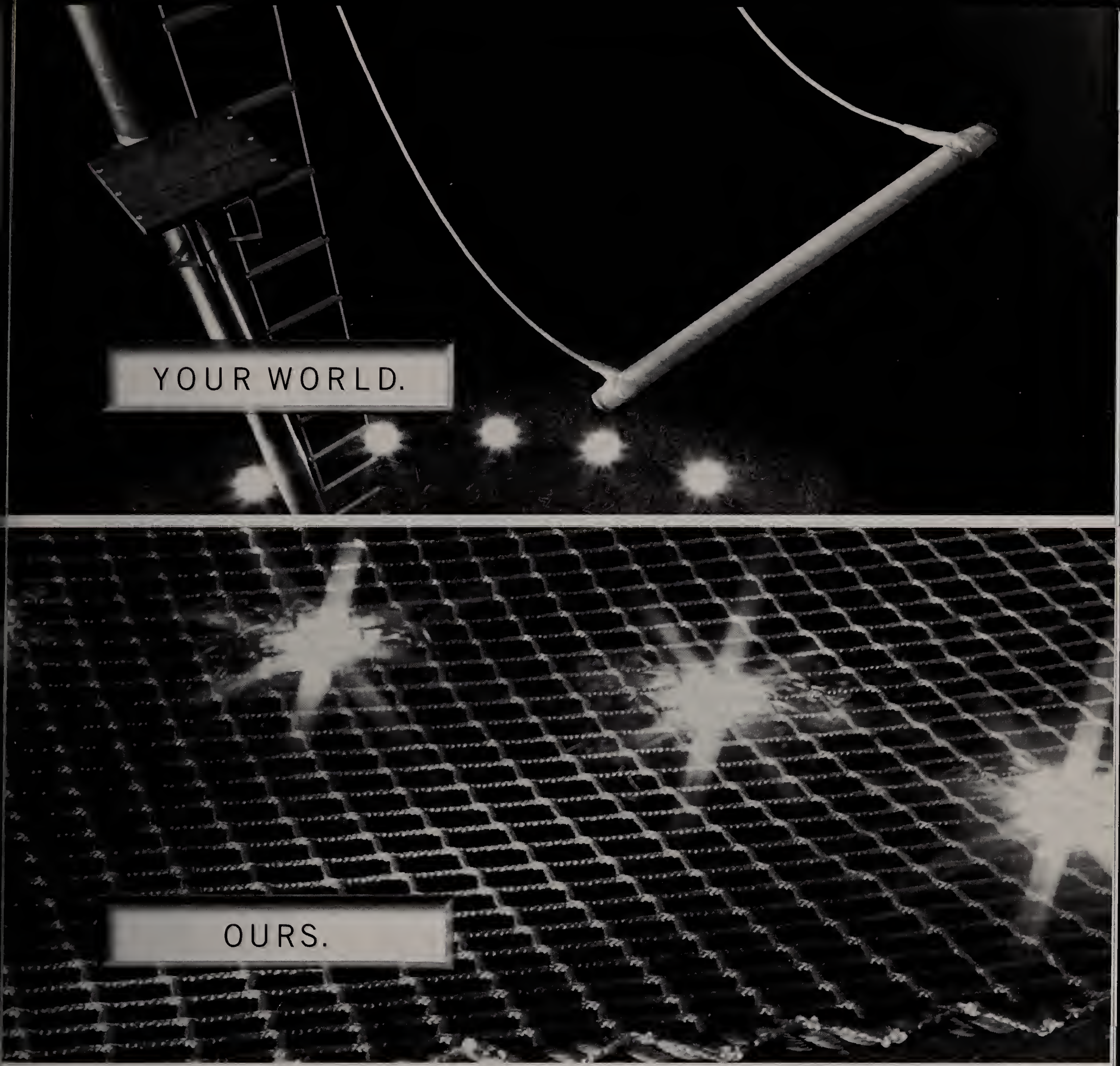

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proves that error-free programming may be tough, but it isn't rocket science. By E.B. Baatz

922. "Sharing Power Safely" *(Page 50)—without the right tools, providing end users with access to corporate data resources can be a disruptive rather than a productive experience. By Megan Santosus*

923. "Talking About an Evolution" *(Page 60)—an expert panel discusses embracing client/server successfully. By Mickey Williamson*

924. "Quality Quest" *(Page 26)—client/server application-development techniques are still emerging, but quality-control standards aren't as stringent as they might be. An Insights column by Capers Jones*

925. "The Network Toolbox" *(Page 70)—the growth in enterprisewide client/server networks increases the need for a comprehensive and uniform set of management tools. A State of the Art column by John Edwards*

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926. "Power Surge" *(Page 26)—utility companies face change as regulators and demanding customers push for open competition and improved service. A Preparing for Change feature by Peter Fabris*

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How To Enhance Your Negative Capability
Our Annual Survey Of IS Performance

927. "Everything You Need to No" *(Page 34)—service-oriented CIOs with tight budgets walk a fine line when handling problematic requests from end users. By Richard Pastore*

928. "Performance Appraisal" *(Page 44)—everyone agrees on how CIOs can best serve their companies. Unfortunately, only CIOs think they're already doing it, according to the sixth annual executive survey by Ernst & Young. By Mickey Williamson*

929. "The Adaptable Workforce" *(Page 56)—companies are struggling to find ways in which both the organization and the individual can thrive. By Anne Stuart*

930. "Shared Objectives" *(Page 68)—object-oriented information systems promise to make maintaining technology easier, but professionals must learn how to think in new ways. A State of the Art column by Robert Ettl, Peter Fingar and Dennis Read*

931. "A Helping Hand" *(Page 80)—support technology enabled Entergy to decrease its number of help desks from 13 to two and facilitates trend analysis. A Working Smart column by Alice Dragoon*

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932. "Not-So-Easy Payment Plans" *(Page 34)—what's stalling Internet commerce? Chances are it's the lack of a safe way to lay your money down. By Fred Hapgood*

933. "Higher Learning" *(Page 44)—non-IS executives need to make wise technology decisions. Having the right tools and training is the key. By E.B. Baatz*

934. "They Reign in Spain" *(Page 54)—Hewlett-Packard is succeeding worldwide through a shrewd choice of location, innovative management and the skillful use of IT. A Global Enterprise feature by Gary Abramson*

935. "The Importance of Getting Smart" *(Page 62)—Stan Davis thinks the education system needs to smarten up if companies are to prosper in a knowledge-based economy. An interview by Richard Pastore*

936. "Survival Strategies" *(Page 26)—CIO's ROIT Executive Retreat attendees discussed understanding the value of applications and forging stronger IS and management partnerships. A Reporter's Notebook by Abbie Lundberg*

937. "Meet Stanky..." *(Page 76)—to know him is to feel a shiver of dread. He is a corporate archetype, and if you let him, he'll snack on your tender career. A CIO Light column by Stanley Bing*

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938. "The Virtues of Virtual Documents" *(Page 32)—virtual document management requires sharing and maybe a little bit of selfishness. By Richard Pastore*

939. "Doing Good By Doing Well" *(Page 42)—running IS in nonprofit organizations requires a special resourcefulness, as demonstrated by the New England Shelter for Homeless Veterans, the Nature Conservancy and The Salvation Army. By Peter Fabris*

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Managing Virtual Documents

940. "The State of the Unions" *(Page 54)—organized labor fights to hold the line on job losses while ensuring its members have the technological know-how to compete for future jobs. By Tracy Mayor*

941. "Migration Plans" *(Page 24)—Microsoft's Windows 95 will require significant training and support. With 10 million copies expected to ship, CIOs should be prepared. A Gartner View column by William Kirwin*

942. "They Also Serve" *(Page 28)—those who know how to think about a business with technology's capability in mind are being deployed throughout the organization. An Insights column by Robert F. Morison*

943. "The Speed Ticket" *(Page 62)—low prices and mainframe-like performance are helping massively parallel processing make inroads into commercial applications. A State of the Art column by John Edwards*

944. "Mr. Tripp Goes to Washington" *(Page 72)—when it comes to reinventing government, there's a right way and a wrong way to do it on the Internet. A CIO Light column by Tripp Strange*

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945. "Experts for Hire" *(Page 32)—most companies need help tapping into intellectual capital and with managing knowledge. Teltech offers human-guided access to experts and databases. By Carol Hildebrand*

946. "The Changing of the Guard" *(Page 44)—Barclays Group, Britain's largest bank, prepares for a fully wired future. By Elizabeth Heichler*

947. "Entering the Fast Lane" *(Page 52)—as groupware, imaging and EDI become increasingly common, companies need higher-speed communications. By Mickey Williamson*

948. "A New Purchase Order" *(Page 60)—Steven Kelman, director of the Office of Federal Procurement Policy, has a mission to make government's acquisition process look more like corporate America's. An interview by Leigh Buchanan*

949. "All Together Now" *(Page 26)—if you want something done right, do it yourself. If you want it on time and under budget, you might have to break the rules. An Insights column by Anne Stuart*

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How Barclays' Yank Helped The British Bank Overhaul Its IT Strategy
Accelerating Times On The Bandwidth Bandwagon

951. "Out of the Box (and Into the Fire)" *(Page 84)—the pace of change is so fast you can't keep up. Let Ezra's business seminar help. It probably won't kill you. A CIO Light column by Ezra Poundcake*

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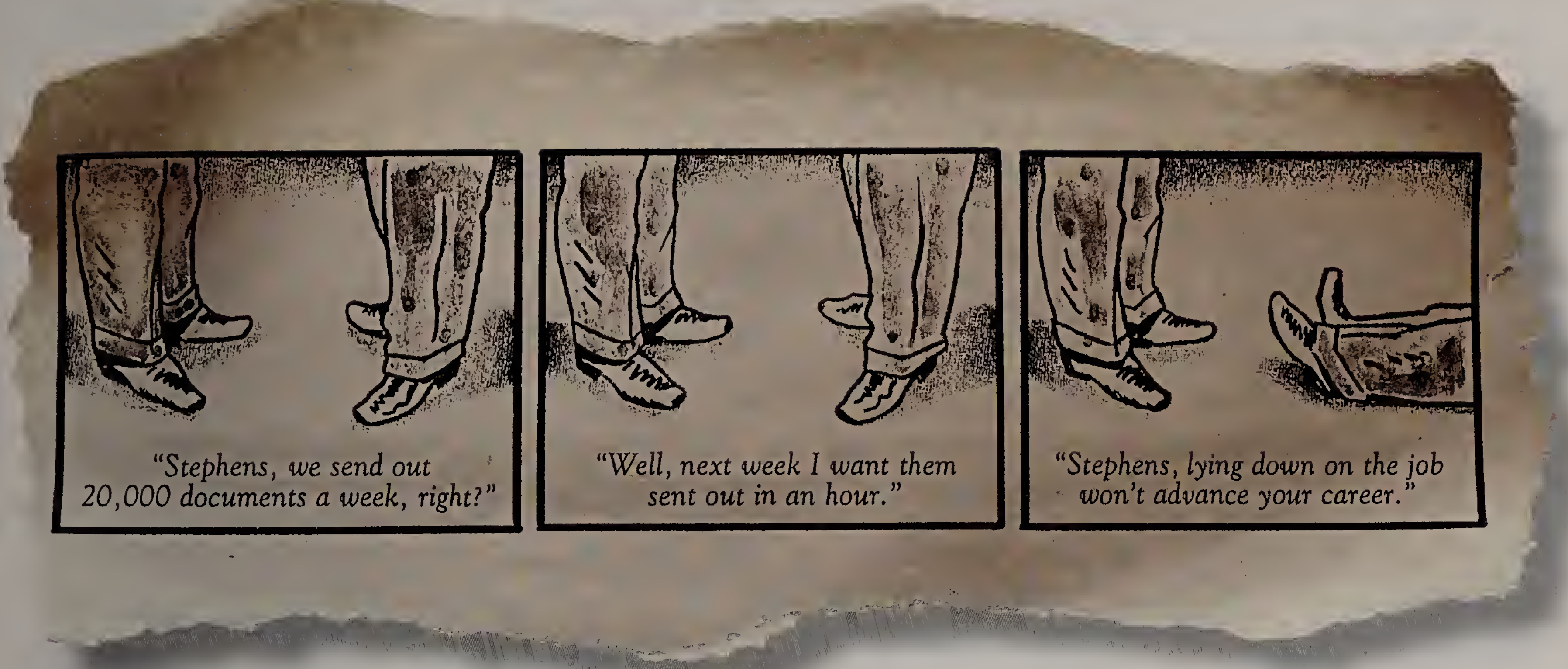
952. "Forging a Global Appliance" *(Page 32)—Whirlpool's carefully planned global design system will significantly change the way work is done. By Carol Hildebrand*

953. "Personnel Matters" *(Page 44)—human resources offices don't look like they used to, now that they are fully armed with IT. By Megan Santosus*

954. "Traffic Report" *(Page 56)—a hard look at the viability of the Internet as a medium for doing business. A WebMaster feature by Fred Hapgood*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956. "The People Factor" *(Page 24)—in many reengineering efforts, it's the employees—not the technology—that make or break a project. A Reporter's Notebook column by Lucinda Halate*

957. "A Long Reach" *(Page 74)—new network-simulation tools let IS managers model and administer enterprise networks with live data from a central site. A State of the Art column by Peter Cassidy*

958. "How I Got Fired" *(Page 78)—on paper it may be clear, but the mind strains to recall exactly how it happened. A CIO Confidential column by W.F. Dyle*

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960. "Pumping Up the Volume" *(Page 38)—expansion-minded businesses, including Town Sports International, Regal Cinemas and Duracom Computer Systems, use technology to help accelerate growth without stifling customers. By Megan Santosus*

961. "Risky Business" *(Page 50)—the city of Sunnyvale, Calif., must be careful to manage risk, particularly those perils peculiar to its massive migration to a client/server platform. A Second Opinions feature by Peter Fabris*

962. "The New IS Role Models" *(Page 62)—the role of senior IS executives is splintering, transmogrifying and regenerating. Today there are various models of IS organization and leadership. By Anne Stuart*

963. "A Report Card" *(Page 24)—most management-reporting systems would receive less than a passing grade. Fortunately, the typical problems are easy to address. An Insights column by Ido Millet*

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965. "The Technology Tease" *(Page 80)—let Ezra's brand-new consultancy show you the power of implied technology. A CIO Light column by Ezra Poundcake*

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966. "A European Tour" *(Page 38)—for many companies, cultural, geographical and technological conditions in Europe impose barriers to the effective deployment of strategic IS. A Global Enterprise feature by Jack Ewing*

967. "Daring to Look Down"*(Page 48)—computer downtime happens. CIOs must accept the inevitability of such failures and estimate the costs. By Mickey Williamson*

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Continental Ops: CIOs In Europe

968. "Due Processing of Law" *(Page 62)—the judicious use of IT can improve law firms' ability to communicate and manage huge volumes of documentation. By Megan Santosus*

969. "Magic Numbers, Persuasive Sounds" *(Page 72)—economist Paul Krugman speaks out clearly against all the "fuzzy thinking" that abounds. An interview by E.B. Baatz*

970. "E-Mail Bonding" *(Page 28)—electronic mailing lists can be a valuable tool for IS professional networking and communication. A Webmaster column by Dennis W. Viehland*

971. "Beyond Borders" *(Page 32)—international boundaries don't necessarily demarcate differences in consumer tastes. Nor should they dictate how you run your company—or your IS organization. By Donald A. Marchand*

972. "Brave New World" *(Page 86)—the potential of multimedia technology is limited only by the imagination, but getting started requires realistic planning. A State of the Art column by Alan R. Earls*

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974. "Capital Assets" *(Page 34)—new technologies provide a wealth of new opportunities, as well as their share of challenges, to financial services firms. By Megan Santosus*

975. "A Successful Operation" *(Page 46)—careful planning, a strong client/server architecture and sound management techniques produce bottom-line payback for Brigham and Women's Hospital. By Richard Pastore*

976. "Let's Make a Deal" *(Page 58)—resistant software publishers are finding that third-party relationships can provide a win-win solution to issues of technical support. By John P. Mello Jr.*

977. "Winning the Mobile Game" *(Page 26)—the key to victory is choosing the appropriate information access and delivery technologies. An Insights column by Sami Jajeh*

978. "Test Practices" *(Page 32)—no longer restricted to high-tech certification programs, computerized testing is making its mark in a range of applications. A Reporter's Notebook column by E.B. Baatz*

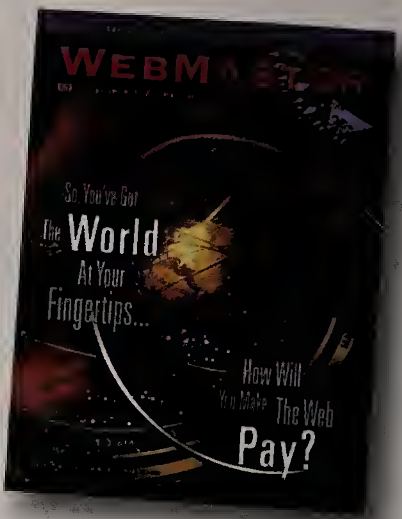
979. "In the Chips" *(Page 72)—the choices are many, the certainties few. CIOs looking to standardize on a single PC microprocessor platform face a difficult decision. A State of the Art column by John Edwards*

980. "Fast-Acting Medicine" *(Page 80)—with a little expert help from BSG Inc., FoxMeyer developed client/server applications in 90 days—and gained the expertise and speed it needed to take the architecture enterprisewide. A Working Smart column by E.B. Baatz*

JUNE/JULY 1995

WebMaster
A Supplement to CIO

WM1. "Weavers" *(Page 26)—in businesses large and small, webmasters are putting in place the prototype strands of content and connectivity that herald their organizations' online identities. By Leigh Buchanan*


WEBMASTER
So You've Got The World At Your Fingertips...
How Will You Make The Web Pay?

WM2. "Digital Rewired" *(Page 36)—a once-golden computer maker mines the rich vein of opportunity running through the World Wide Web. By Anne Stuart*

WM3. "The King of Connectivity" *(Page 44)—in Bob Metcalfe's vision of the Net-to-be, the government regulatory structure lies in shambles, creators of intellectual property are given their due, and even kooks and spam artists get a little respect. By Lew McCreary*

WM4. "For Our Eyes Only" *(Page 14)—all the things that make the Web so hot as a global publishing tool pay off behind the firewall as well. An Inside Tracks column by Leigh Buchanan*

WM5. "Trip Wired" *(Page 18)—cyberspace law is volatile, ambiguous and full of booby traps for the unwary online settler. A Gray Matters column by Peter Brown*

WM6. "On-Site Service" *(Page 52)—you won't make a fortune selling your wares over the Net (at least not yet), but online's level of innovative, interactive service and support can win you legions of loyal customers just the same. A Customer Interface column by Peter Fabris*

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WM7. "Location, Location, Location" *(Page 62)—Web directories make valiant efforts to organize the growing chaos, but searches still often devolve to needle-and-haystack conditions. A Work in Progress column by Fred Hapgood*

JULY 1995

Special Issue: The Knowledge Enterprise

981. "Scavenger Hunt" *(Page 38)—competitive wisdom must be actively sought, recognized and refined, whether it lies within your employees, in company databases or outside the company. By Leigh Buchanan*

982. "Rx for Success" *(Page 48)—at Pfizer, IT means more than information technology. It also stands for insightful thinking. By Alice Dragoon*

983. "Guiding Principles" *(Page 60)—organizations are creating "maps" of their intellectual assets and letting them guide the way. By Carol Hildebrand*

984. "The Medium and the Message" *(Page 68)—whatever approach a company takes to merging information and technology, the CIO is in a perfect position to preside over the marriage. By Leigh Buchanan*

985. "International Studies" *(Page 26)—companies venturing into foreign markets have some serious homework ahead of them. An Insights column about the global enterprise by Thomas J. Howard*

986. "Client/Server Everything" *(Page 30)—a Deloitte & Touche survey of IS executives shows that the client/server revolution sends ripples in all directions and that business-process reengineering is on the rise. An Outlook column by Jeffrey Plewa and Steven Pliskin*

987. "The Outside Track" *(Page 80)—how to meet companies' growing demand for external information. A State of the Art column by Tracy Mayor*

988. "No News is Good News" *(Page 88)—a champion of the people's right to know, he refused to let truth stand in his way. A CIO Light column by Stanley Bing*

989. "Hiring Outside the Box" *(Page 98)—next time you're in the market for help, consider bringing aboard a librarian, a journalist or an anthropologist. A Last Word column by Laurence Prusak*

AUGUST 1995

Special Issue: CIO-100 Best Practices

990. "All for the Best" *(Page 26)—best practices and categories, the selection process and CIO-100 winners.*

991. "Special Delivery" *(Page 32)—by successfully updating processes in human resources, logistics and customer satisfaction, Federal Express has molded itself into a model of best practice care and feeding. By Richard Pastore*

992. "The Chain Gang" *(Page 46)—successful management of the supply chain can save a company both money and time, but CIO-100 winners are taking it a step further. By E.B. Baatz*

993. "Unlimited Partnerships" *(Page 56)—in its quest to stay ahead in the increasingly competitive medical-devices industry, Becton Dickinson found that cultivating relationships with business partners, supported by IT, was the critical step. By E.B. Baatz*

994. "Personnel Best" *(Page 62)—as workers enter the Knowledge Age, they find career paths that were once etched in stone are now impossible to decipher. Today's human resources managers have their work cut out for them. By Megan Santosus*

995. "The Learning Company" *(Page 70)—Raychem supports career development as well as product development. By Megan Santosus*

996. "The World Class" *(Page 76)—political change and blurring borders are requiring that companies doing business abroad adopt a global mind-set. By Anne Stuart*

997. "Guest Practices" *(Page 84)—by thinking globally and acting locally, Radisson has become one of the world's fastest-growing hotel chains. By Anne Stuart*

998. "Service Stars" *(Page 90)—good customer service is no longer enough; today's leaders offer nothing less than outrageous satisfaction for customers. By Carol Hildebrand*

999. "Satisfaction Guaranteed" *(Page 98)—insurer USAA understands that serving customers well doesn't mean that things will never go wrong. By Carol Hildebrand*

1000. "Accounting for Change" *(Page 102)—today's finance and accounting operations are lean, mean and strategic, thanks in no small part to IT. By Peter Fabris*

1001. "Inspired Accounting" *(Page 110)—with MUSE, hard numbers back up innovative ideas at Charles Schwab. By Peter Fabris*

1002. "Practicing Judgment" *(Page 114)—a panel of judges chooses best practices.*

SEPTEMBER 1, 1995

1003. "Global Market Scents" *(Page 36)—Avon Products Inc.'s global financial system helped its expansion into emerging markets. A Global Enterprise feature by Peter Fabris*

1004. "Airport 95" *(Page 48)—far from the buzz of Denver, airports like Houston's IAH are setting a course for unspectacular but effective IT that gets the job done without bursting the budget. By Tracy Mayor*

1005. "Modern Medicine" *(Page 66)—with changes sweeping the health-care industry, pharmaceutical companies are struggling to maintain healthy profits. And IT may very well be the spoonful of sugar that helps the medicine go down. A Preparing for Change feature by E.B. Baatz*

1006. "A New Twist" *(Page 26)—the Helix methodology for improving mission-critical workflows can help companies solve business problems while raising the status of IS. An Insights column by Michael R. Wood*

1007. "Hold Onto That Turf" *(Page 30)—the battle for control of the company's Web site has begun, and IS organizations that don't make themselves indispensable fast risk being pushed to the sidelines. A Webmaster column by Jim Sterne*

1008. "IS Managers See the Light" *(Page 76)—IS managers are becoming "do-it-yourselfers" with tools that streamline and document critical applications. A State of the Art column on tools for managing the software-development process by Alan R. Earls*

1009. "A Continental Conference" *(Page 82)—European IS executives aren't all that much different from their U.S. counterparts. A Reporter's Notebook column on the CIO European Symposium by Richard Pastore*

1010. "Universal E-mail" *(Page 88)—Control Data Corp.'s mail hubs help Honeywell divisions cross intracompany boundaries while preserving their autonomy. A Working Smart column by Tracy Mayor*

SEPTEMBER 15, 1995

1011. "Distributing the Data Wealth" *(Page 42)—Texas Commerce Bank gets some advice on managing distributed data more effectively. A Second Opinions feature by Megan Santosus*

1012. "The Cares Up There" *(Page 56)—not everyone is cut out for the heady stuff of global technology strategy. A Global Enterprise feature by E.B. Baatz*

1013. "Widget Racers" *(Page 68)—with basic research on the back burner and budgets nearly at a standstill, the hot R&D objective these days is to turn ideas into products at breakneck pace. By Carol Hildebrand*

1014. "Ready for Takeoff" *(Page 78)—after years of razor-thin profit margins, Delta Air Lines teamed up with AT&T to improve its IT operations and cut costs in a nontraditional outsourcing arrangement. By Daniel Gross*

1015. "A Matter of Marketing" *(Page 30)—if IS departments are to survive, they must not only add value for their customers but also*

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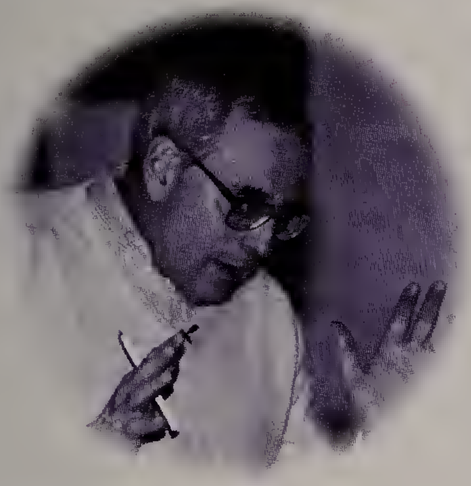

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1016. "Asset Appreciation" *(Page 36)—new tools and structured approaches can simplify IT asset management and generate significant savings to boot. A Gartner View column by Mike Vargo*

1017. "Remodeling Project" *(Page 88)—surround strategies can help meet the demands of modern-day code without tossing out legacy systems. By Shailendra Jain*

1018. "Your Bloody ROIT" *(Page 100)—some IS groups devote a lot of resources to minutely measuring the value of their contributions. They call it ROIT. But not everyone thinks it's such a hot idea. A CIO Confidential column by W.F. Dyle*

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WebMaster
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WM8. "Take My Web Site, Please" *(Page 44)—if the Internet explosion caught you unprepared to field a dazzling Web site with resources on hand, outsourcing may be the way to go. By Mickey Williamson*

WM9. "The Business Outlook" *(Page 52)—Web-borne electronic commerce is more robust than you might think. Look closely, and you'll see the emerging outlines of a trading venue where secure, flexible, low-cost "Virtual Private Internets" pick up where the traditional EDI VANs leave off. By Leigh Buchanan*

WM10. "CommerceNet Present Value" *(Page 60)—how well is the pioneering consortium of high-tech vendors progressing toward its goal of making cyberspace safe for doing business? By Fred Hapgood*

WM11. "Easy Clickings" *(Page 20)—how to build a Web site they'll have to tear themselves away from. A Customer Interface column by Jim Sterne*

WM12. "Open Wide" *(Page 24)—there's no such thing as being too accessible. An Inside Tracks column by John Patrick*

WM13. "Getting a Line on ISDN" *(Page 66)—the engine of the famous digital services network still idles despite decades of hype and broken promises. Will the Web be its making, or only another occasion for disappointment? A Work in Progress column by Fred Hapgood*

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1019. "Long-Distance Relationships" *(Page 37)—foreign companies with U.S. offshoots may try to remake their American workforces in the parents' image, leaving some frustrated and confused. A Global Enterprise feature by Anne Stuart*

1020. "The Switch Is On" *(Page 46)—the world may not be ready for ATM at the desktop, but IS executives would be wise to heed tales from those companies that have been there, including Argonne National Laboratory, Tandem Computers and Hughes Aircraft. By E.B. Baatz*

1021. "Competing Interests" *(Page 63)—Michael E. Porter says operational excellence may be at the heart of much of today's business thinking, but it has little to do with what it takes to make a company truly successful. An interview by Richard Pastore*

1022. "Deja View" *(Page 72)—an update on major strategic-system implementations at Sallie Mae, Ryder and Gallup. By Peter Fabris*

1023. "I'm OK, You're Really Weird" *(Page 86)—Myers-Briggs testing helps companies identify the different personality types of team members who are tempted to point fingers. By Carol Hildebrand*

1024. "Owner's Manual" *(Page 30)—with proper care and feeding, business processes can be continually improved. Assigning a process owner is the first step. An Insights column by Robert M. Curtice*

1025. "Hitting a Moving Target" *(Page 100)—faster, easier and more timely data access and analysis is just the beginning of why OLAP is such a hot topic these days. A State of the Art Column by Alan R. Earls*

1026. "Hard Sell" *(Page 112)—a profile on Steelcase Inc. reveals that no matter how smart a company's sales strategy, IS still must sell the technology to its toughest customer—the sales department. A Working Smart column by Stephen Mills*

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1027. "Perception is Reality" *(Page 38)—Johnson Controls, Home Depot and Brown & Root learn that IS needs reliable ways of seeing itself as others see it. By Megan Santosus*

1028. "First Port of Call" *(Page 50)—a program to promote IT innovation among third-party port service companies may just be what Rotterdam needs to secure its status as the world's largest commercial port. A European Spotlight by Richard Pastore*

1029. "Good Market, Vietnam" *(Page 58)—Vietnam is widely viewed as one of the hottest global markets emerging today, but it currently faces a multitude of political, technological and infrastructural limitations. By Lynda Radosevich*

1030. "The Sound and the Fury" *(Page 68)—tomorrow's telecom technology is happening now. How do IS managers prepare today for a future that is both intriguing and unpredictable? By John Edwards*

1031. "The Team at the Top" *(Page 26)—the effectiveness of the CEO/CIO relationship can be a decisive factor in a company's success or failure—particularly when an organization is undergoing a major business transformation. AnInsights column by Joseph Movizzo and Robert M. Howe*

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Doing Business in Vietnam

1032. "Big Change Comes in Big Packages" *(Page 32)—companies implementing SAP face large-scale changes in strategies, structures, process and culture. A Think Tank column by Tom Davenport*

1033. "I Am the Web Man" *(Page 80)—with the Duke of URL, our pundit in residence has hung his shingle in cyberspace. A CIO Light column by Ezra Poundcake*

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Data Warehouse Game Plans
Developing A System Without Getting Fooled
The State of IS Benchmarking

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1034. "Benchmarking Comes of Age" *(Page 30)—practitioners offer insights on the current state and future applications of this maturing IT management tool. By Richard Pastore*

1035. "Form Follows Function" *(Page 40)—the construction of a data warehouse begins with careful attention to the overall architecture; technology decisions should wait. By Carol Hildebrand*

1036. "Hired Guns" *(Page 56)—during times of tumultuous transition, interim CIOs may be the answer. By Peter Fabris*

1037. "Exchange of Ideas" *(Page 66)—the Chicago Mercantile Exchange earned this year's Society for Information Management Partners in Leadership Award for its collaboration between IS and business executives. By Christopher Koch*

1038. "The Object-Oriented Express" *(Page 74)—long promoted as the solution to all IT problems, object technology is not without risks, but it can offer great rewards. By JohnEdwards*

1039. "Net Gains" *(Page 26)—with productivity up and spending on mainframes and leased lines down, Sterling Software has something to crow about. A Webmaster column by Phillip A. Moore*

1040. "Think Local, Control Global" *(Page 86)—enterprise LAN costs are spiraling out of control, and IS is in the hot seat again. It's time to bring some method to the madness. A Gartner View column by David Cappuccio*

1041. "Hold the Invoices, Please" *(Page 96)—when a system that just works isn't enough. A Working Smart column about PGL/Huttig Distribution's invoicing system by Christopher Koch*

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1042. "An Even Keel" *(Page 42)—the Cold War spending boom and subsequent bust left Bath Iron Works in a precarious position; will an edict from the top and a connectivity strategy help the shipyard steady its course? By E.B. Baatz*

1043. "Dutch Masters" *(Page 58)—a roundtable discussion with seven executives in the Dutch information systems and services industry provides proof that, at least for IT management, it's a small world after all. By Richard Pastore*

1044. "Beat the Clock" *(Page 64)—client/server development projects are notorious for their lateness. But some CIOs have learned how to identify and overcome the barriers to timely delivery of such systems. By Lynda Radosevich*

1045. "Quality German (Re)engineering" *(Page 72)—Volkswagen needed IT's help to retool its business for greater speed, lower costs and higher productivity—without running down its domestic workforce. A European Spotlight feature by Jack Ewing*

1046. "Elusive Assets" *(Page 28)—meeting in Houston, business leaders address the challenges of managing knowledge. A Reporter's Notebook column by Anne Stuart*

1047. "The Virtual and the Physical" *(Page 36)—the professional mobility enabled by technology is great. But there is a little-discussed dark side to virtuality. A Think Tank column by Tom Davenport*

1048. "Go Configure" *(Page 80)—the dilemma confronting most information technology specialists and managers today is not whether to use CM tools but rather which tools to use. A State of the Art column by Daniel Gross*

1049. "Meet My Methodology" *(Page 94)—sometimes consulting seems confusing by design. But slowly it dawns on you that maybe the ultimate design is for the consultant to hold the client upside down and shake him until all the money falls out of his pockets. A CIO Confidential column by W.F. Dyle*

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WM14. "Working with a Net" *(Page 22)—threats to the sanctity of your Web site are on the rise, but with the right tools and some IS expertise, you can both serve and protect. By William Stallings*

WM15. "Internal Combustion" *(Page 28)—at Sandia National Laboratories, a team of high-octane evangelists is turning the organization into an engine of Web-based productivity innovation. By Leigh Buchanan*

WM16. "Strands Across the Enterprise" *(Page 38)—smart companies are finding boundless opportunities to integrate the Web with a broad array of business strategies, functions and technologies. By Anne Stuart*

CIO
The U.S. Coast Guard Wants You
Could This Be Your Future Employer?

WM17. "Cash Advances" *(Page 19)—now that they're no longer kings of the transaction castle, banks are looking at various forms of online delivery to give them a reason for being. A Work in Progress column by Fred Hapgood*

WM18. "Its Weight in Gold" *(Page 46)—for one company, that supposedly elusive Web payback just keeps on coming. A Business Case column by Neil Knox*

WM19. "Now, a Link to Our Sponsor" *(Page 55)—advertising is becoming big business on the Web, and you don't have to be HotWired to get in the game. An Ad Infinitum column by Rosalind Resnick*

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1050. "The Traffic Report" *(Page 38)—in cities beset by traffic snarls, building new roads makes matters worse. But technology can pave the way for a smoother commute. By Peter Fabris*

1051. "CIO Search and Rescue" *(Page 54)—the Coast Guard is looking for a captain to chart a smoother course for its IS future. By Richard Pastore*

1052. "Mutable Markets" *(Page 68)—what would you call a marketplace that was created, defined, nurtured and exploited through the use of information technology? Some business theorists are calling it a "marketspace." By Christopher Koch*

1053. "The Year in Review" *(Page 80)—an index of all major articles published in CIO and WebMaster in 1995, including a cross-reference by article type.*

1054. "Wizard of Odds" *(Page 28)—a crisis in customer confidence convinced Equitable to scrap an existing system and start from scratch. Was it a gutsy move or a strategy for survival? Or both? A First Person column by Edward Hayes*

1055. "Fail Safe" *(Page 32)—CIOs discover that real learning means never having to say you're sorry. A Reporter's Notebook column by Christopher Koch and Peter Fabris*

1056. "A Qualified Success" *(Page 96)—in its quest to keep up with the ISO 9000 quality standard, Sun found that IT can be a critical ally. A Working Smart column by Christopher Koch*

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B. Communications Technology/ Networking *903, 916, 917, 947, 952, 955, 957, 977, 1010, 1020, 1030, 1040*

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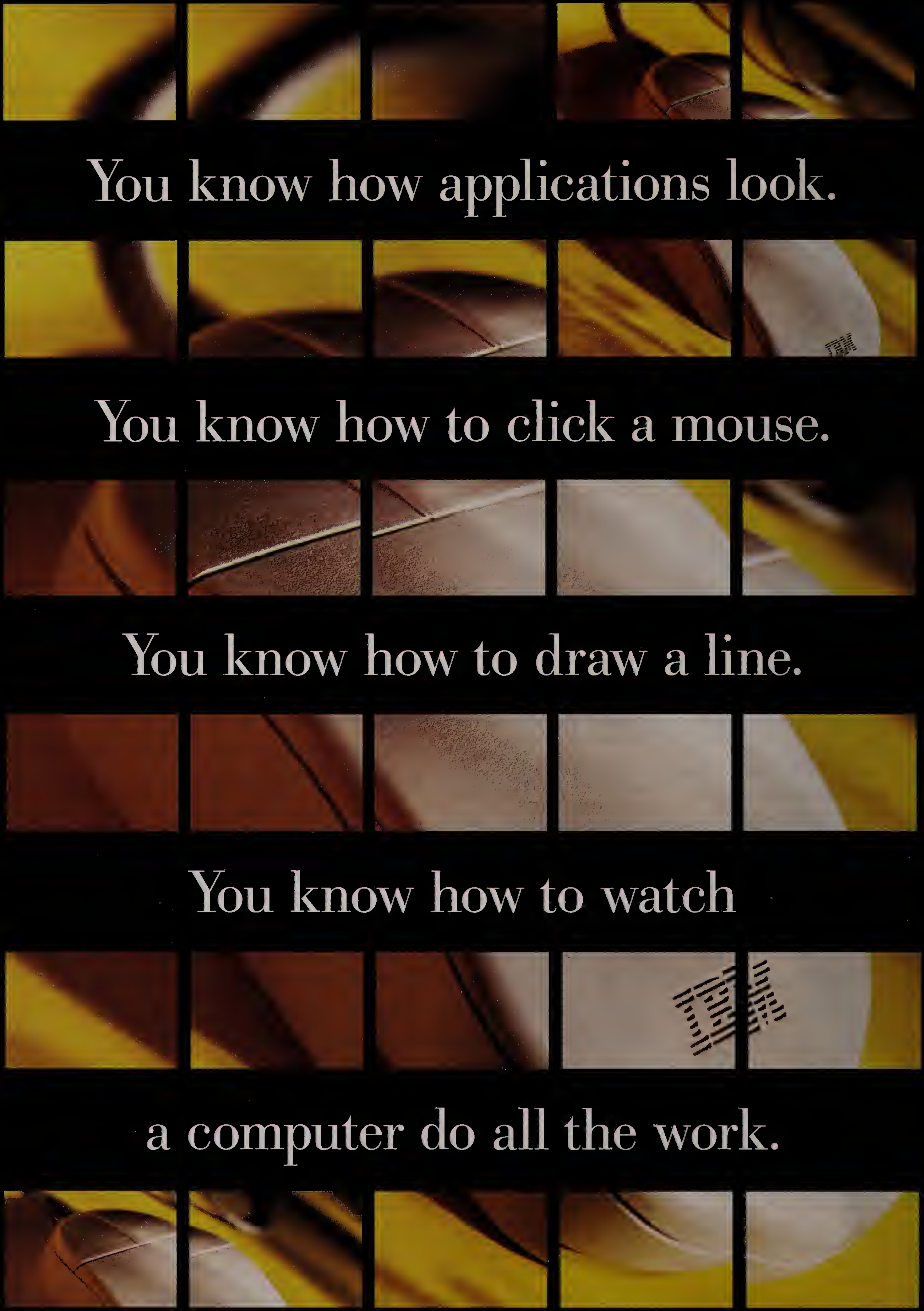
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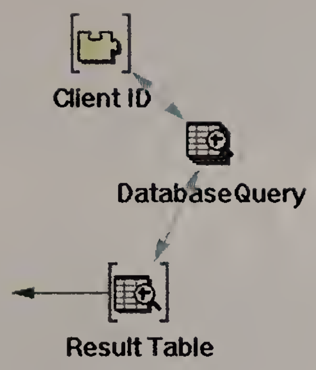

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Quantified Success

In its quest to keep up with the ISO 9000 quality standard, Sun found that IT can be a critical ally

“Hell is paved with good intentions,” said 18th century author Samuel Johnson. In the quality movement, hell is paved with something known as “documentation,” a swirl of official scribblings that can overwhelm any well-intentioned administrator.

For Sun Microsystems Computer Co., based in Mountain View, Calif., the swirl revolves around a set of quality edicts developed by the International Standards Organization (ISO) in 1987. Known as ISO 9000, it establishes quality baselines for such processes as production, design and service; in qualifying for the standard, companies gain the industrial equivalent of the Good Housekeeping Seal of Approval. ISO 9000's language is purposely vague enough to apply across industries—and stringent enough to create a paper-paved road to you know where.

Information overload is almost inevitable in the quest for quality: To qualify, you need to quantify. Yet Paul O'Reilly, Sun's manager of worldwide quality, knew there had to be a better way to pave the pathway than with paper. Sun qualified for ISO 9000 in 1992, for which its manufacturing arm documented approximately 1,600 different procedures (each of which describes a manufacturing process and everything required to carry it out, such as proper job training and product testing). ISO 9000 required that employees keep copies of each one- to 50-page procedure that affected their jobs; if the procedure changed, each copy was updated, rewritten, stamped with the words “control copy” on each page and redistributed. It was a bureaucratic nightmare.

The nightmare worsened when a problem was identified in a manufacturing process or if ISO changed its standards. In such cases, Sun's Corrective Action Coordinators (CACs) sent e-mails and official forms describing the problems to the owners of the affected processes. The process owners performed analyses and sent back the forms with a corrective action plan and estimated completion date. That's when the trouble really started, according to Baljit Sandhu, manager of quality for U.S. operations. “Forms would be lost, and there would be so many corrective actions going on at once that some would inevitably fall through the cracks,” she says.

Frustrated users organized a committee in 1992 to overhaul the documentation system and put it online. The result was a relational database tool called Docview that keeps track of all current and past procedures and lets users access them using keywords.

The committee then took on the murky corrective action system with a new tool called Online System for Corrective Action Requests (OSCAR), which it developed jointly with software company Remedy Corp. by customizing that firm's commercial AR product using C and C++. With OSCAR, CAC staff enter requests for corrective action into the tool's relational database, including the e-mail addresses of affected process owners. Those owners are responsible for keeping their request files up to date in OSCAR's database until corrective action is taken; status can be viewed in real-time. So that nothing can be forgotten, there's also an “escalation” feature, which sends automatic notification to a process owner's boss if the corrective action isn't completed within 30 days (Sun's requirement, not ISO's).

“There's nowhere to hide now,” jokes Sandhu.

More important, “we no longer have to keep our customers in the dark,” adds Zuheir Totari, project manager for quality. “We give them information as it becomes available rather than having to wait until everything is completed.”

Together, the new systems have reduced the CAC staff by one-half, turnaround time for corrective actions from an average of 90 days to 30 and paper to zero. There's also more information about the information. For example, staffers can analyze patterns of recurring problems to improve product quality. It's all part of Sun's continuing quest to tame the bureaucratic beast of ISO 9000.

–Christopher Koch

VITAL STATISTICS

Organization: *Sun Microsystems Computer Co., Mountain View, Calif.*

Applications: *Online documentation and corrective action applications for internal quality program*

Technologies: *Client/server applications developed using C, C++, UniPress Software Inc.'s XView and Remedy Corp.'s AR; Sun Microsystems' SPARCstation 2 workstation, Solaris 2.4, Sybase 4.9.2 database*

Scope: *50 quality department users worldwide*

Sponsor: *Paul O'Reilly, manager of worldwide operations quality*

Objective: *To create online ISO 9000 documentation and corrective action applications to improve quality and accuracy and reduce administrative time Payoff: Instantaneous online access, increased analytical capabilities, improved information retrieval, and more accurate and timely corrective action procedures*

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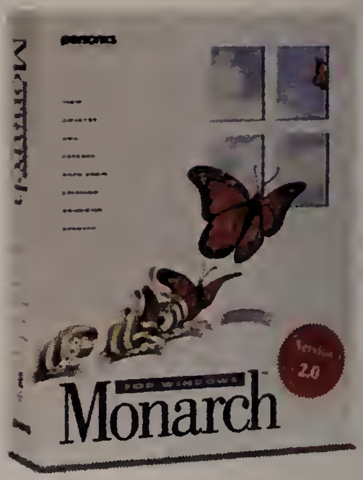

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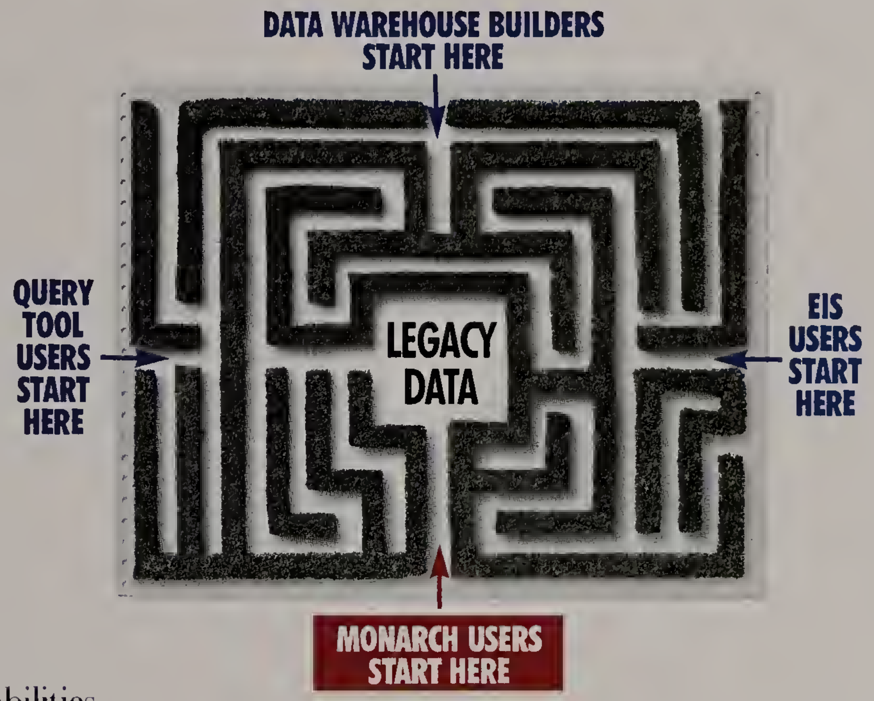
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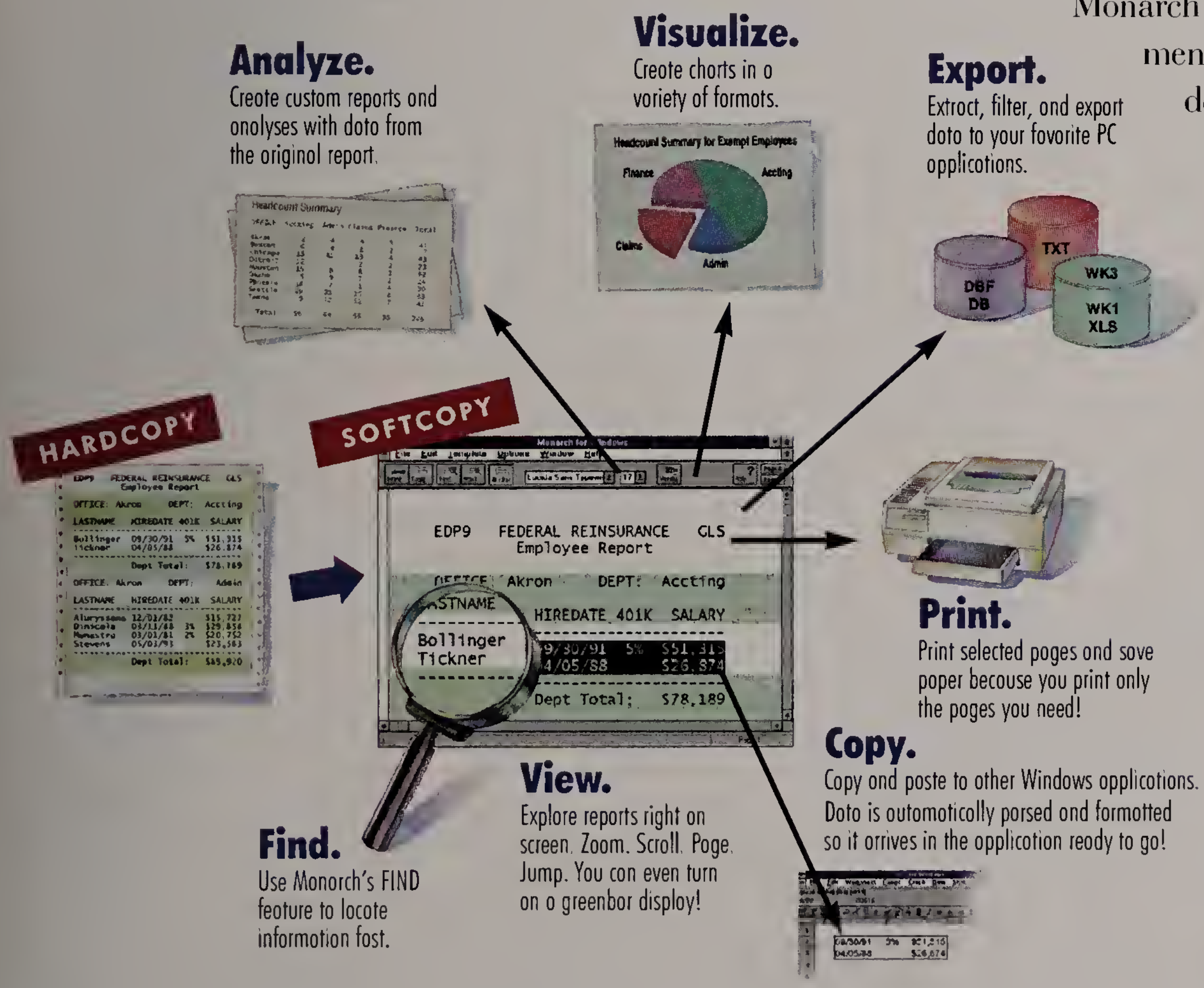

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